Y'awl Come On Down . . .

. . . to Dallas for the 1977 National Computer Conference at the Dallas Convention Center next week.

The center (left) will house 1,142 booths from over 350 exhibiting companies displaying a gamut of products from microprocessors to mainframes — with minis, peripherals, software, communications gear, supplies and terminals wedged in between.

The largest computer exhibit ever in the U.S. will also include 78 more booths in a special section for the Personal Computing Fair, held in conjunction with NCC.

The American Federation of Information Processing Societies (Afips), which hosts the yearly event, expects 25,000 to 30,000 data processing personnel to crowd into the exhibit hall. They will also partake of a technical program consisting of 89 sessions ranging from the esoteric aspects of computer science through hints on how to deal with people to practical applications of computers in business.

In addition, there will be 11 "Professional Seminars," conducted primarily by vendors, covering such subjects as data base management systems, microprocessors, structured design and the development of long-range DP plans.

Three plenary sessions will also be included in the program, highlighted by a keynote address by Mark Shepherd Jr., chairman of the board at Texas Instruments, Inc.; the Afips presidential address by Dr. Theodore J. Williams; and an industry plenary address by A. Douglas Murch, a senior vice-president at Prudential Insurance Co. of America.

This is *Computerworld*'s NCC Preview Issue and a report on the week's events follows Page 52.

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices

© 1977 by Computerworld, Inc.

Price: $15/year June 6, 1977 Vol. XI, No. 23

Ambitious EFT: Quintet of Banks, Quartet of Vendors

By Toni Wiseman
Of the CW Staff

BALTIMORE — Maryland Switch, Inc., a bank services corporation jointly owned by five Maryland banks, has started an ambitious pilot electronic funds transfer (EFT) switch operation supporting a network of multivendor terminals.

The banks participating in the project include Equitable Trust Co., First National Bank of Maryland, Maryland National Bank, Suburban Trust Co. and Union Trust Co. of Maryland.

Transactions generated by a bank customer are routed from the terminals at retail locations via the switch to the data base of the participating banks or to Service Center, Inc., a charge card processing center operating on behalf of several of the banks.

Maryland Switch is operating an IBM 370/145 with a Periphonics, Inc. front end. The network currently supports four types of terminals — Amcat, AT&T's Transaction Telephone Model I, Burroughs' TT 602 and IBM's 3606 or 3608.

The terminals have been selected by the banks that will be marketing them, and the variety is by no means limited to these four, according to Roger J. Abouchar, vice-president of Kranzley & Co., which helped develop the system.

Data is transmitted from the terminals to the switch's computer primarily over dial-up phone lines and over 2,400 bit/sec leased lines from the switch to the banks' computers, Charles Shaab of Service Center, Inc., said.

Response time has averaged 8 sec per transaction, including transmissions to/from California for all out-of-state authorizations, he said, noting this was satisfactory.

During the pilot, only credit-authorization and check-verification transactions are being handled, but the banks will eventually offer a wide range of services including credit card transactions for BankAmericard and Master Charge, local

(Continued on Page 6)

Anticompetitive Partnership?

U.S. Probing SBS for Antitrust Offenses

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — The Justice Department has launched an investigation into Satellite Business Systems (SBS) for possible antitrust violations.

Civil Investigative Demands (CID) have been served on SBS and the partners that own it — IBM, Communications Satellite Corp. (Comsat), Comsat General Corp., Aetna Life and Casualty Co. and Aetna Casualty and Surety Co.

"We have a civil antitrust investigation going on into the [SBS] joint venture to see whether there might have been violations of Section I of the Sherman Act or Section 7 of the Clayton Act," a Justice spokesman said last week.

Section I of the Sherman Act prohibits any combination, contract or conspiracy in restraint of trade, such as price fixing, agreements not to compete and agreements to carve up markets. The Clayton Act prohibits anticompetitive mergers that would serve to substantially lessen competition.

A joint venture such as SBS may be considered anticompetitive if it is determined that a partner could have done it individually or with just one other partner, the Justice Department spokesman explained.

A CID was described as similar to a subpoena which is authorized under federal statutes in civil antitrust investigations. If the responses to the CIDs "develop sufficient evidence" that antitrust laws have been violated, then an antitrust suit could follow, the spokesman said.

The CIDs request documentary materials dating back to 1966 related to the establishment of SBS and the acquisition of the assets of the predecessor organizations. The SBS partnership is an outgrowth of the

(Continued on Page 2)

Study Says Users Should Pursue Critical Errors, Cope With Rest

By Frank Vaughan
Of the CW Staff

NORTHRIDGE, Calif. — Since error detection and correction is so costly, users should not strive for perfection but rather pursue the "critical errors and be prepared to live with the rest,"

This thesis was expressed recently by Robert L. Patrick in a study commissioned by the National Bureau of Standards (NBS).

The study, which may or may not be accepted and published by the NBS, is entitled "Dynamic Performance Assurance Study: In-Process Detection and Correction of Errors in Computer Information Systems."

Dynamic performance assurance, according to the author, is the result of "a hierarchical set of provisions built into a computer system in an attempt to guarantee that the entire system . . . performs properly or that prompt corrective action is initiated."

By entire system, the author indicated he meant hardware, software, applications programs as well as manual procedures.

The focus of the study was narrowed to techniques that can be adopted without rewiring the computer or recoding the operating systems, Patrick said.

There are four stages of assurance, according to the study.

The foundation of all such assurance lies in the architecture of the computer hardware, specifically the checking that is built into each box and how those checking features are integrated into a checking subsystem.

The second stage is software. What does it do with hardware error signals, and what

(Continued on Page 6)

Xerox Printer Uses Plain Paper, Outputs Two Pages Per Second

NEW YORK — An electronic xerographic printing system that produces text, business forms and other images on plain 8.5- by 11-in. paper was introduced here last week by Xerox Corp. The Xerox 9700 printing system prints two pages a second — up to 18,000 line/min — depending upon type size and format, according to a spokesman.

Print quality is achieved with a resolution of 90,000 dot/sq. in., he noted.

A laser scanner is used to project images of both the form and its contents for simultaneous printing, the spokesman explained. Because the images are created electronically, type and forms design choices are virtually unlimited, he claimed.

The image of a page can be rotated 90 degrees, allowing continuous printing either vertically or horizontally from page to page with no reduction in productivity, he added.

Dual paper feeders and output stackers, "low paper" and "full output bin" operator warnings and a magnetic disk buffer support continuous operation. The buffer stores up to 800 typical pages of information from a magnetic tape or host processor, Xerox said.

The control subsystem of the 9700 provides data handling, formatting, buffering

(Continued on Page 6)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg U.S. Pat. Off.

EDITORIAL
Editor — E. Drake Lundell Jr.
Deputy Editor — Ronald A. Frank
Managing Editor — Nancy French
Associate Editor — Donald Leavitt
Associate Editor — Esther Surden
Associate Editor — Molly Upton
Assistant Editor — John P. Hebert
Computer Industry Editor — Toni Wiseman
Washington Bureau — Edith Holmes
Staff Writers — Catherine Arnst, Frank Vaughan
Chief Copy Editor — Cheryl M. Gelb
Copy Editors — Bobbi C. Sternheim, Barbara T. VanScoyoc
Photography Editor — Ann Dooley
Editorial Assistant — Denise Petski
Editorial Cartoonist — Jim Orton
Bureaus:
London — Roger Frampton
Munich — Hans-Jurgen Ballnath
Asia — Hidetsuna Sasaki
Contributors:
Education — J. Daniel Couger
Legal — Roy N. Freed
Taylor Reports — Alan Taylor
Human Connection — Jack Stone
Contributing Editor — Edward J. Bride

SALES
Vice President/ Marketing — Roy Einreinhofer
Advertising Administrator — Terry Williams
Display Advertising — Pam Palmer
Classified Advertising — Frank Collins
Recruitment Advertising — Kathy Steinberg
Sales Promotion Director — Jack Edmonston
Market Research — Kathryn V. Dinneen

CIRCULATION
Vice-President/ Circulation — Margaret Phelan
Circulation Manager — Barbara Jeannetti

PRODUCTION
Manager — Lee Vidmer
Supervisor — Henry Fling
Assistant Manager — Peter Holm

Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529
OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone: 36-40-36/37. Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. Copyright 1977 by Computerworld, Inc. All rights reserved.

50 cents a copy: $15 a year in the U.S.; $23 a year for Canada and PUAS; all other foreign, $40 a year. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.

Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeh Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

COMPUTERWORLD, INC.
Board Chairman/ Publisher — Patrick J. McGovern
President — W. Walter Boyd
VP-Marketing — Roy Einreinhofer
VP-Finance — William P. Murphy
VP-Circulation — Margaret Phelan

ABP MCC MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.ac

Appeals Review Denied

Justice Free to Press U.S. vs. AT&T

By Nancy French
Of the CW Staff

WASHINGTON, D.C. — The Justice Department will move ahead with its antitrust case against AT&T following a refusal by the U.S. Court of Appeals to review a claim by AT&T that the department has no jurisdiction in the case.

The appeal — actually a writ of certiorari — asked the appeals court to review the proceedings from the U.S. District Court in which Judge Joseph C. Waddy ruled last November that the Justice Department did have jurisdiction.

AT&T claimed that as a regulated common carrier, it is subject to regulation only by the Federal Communications Commission and state governments and is not susceptible to antitrust charges.

The appeals court has ordered that a stay on court proceedings be lifted, clearing the way for the two parties to begin exchanging documents in preparation for the case. The document exchange was interrupted last February pending the ruling from the appeals court.

In its suit, the Justice Department is accusing AT&T and its two subsidiaries, Western Electric Co. and the Bell System Laboratories, of monopolizing, conspiring to monopolize and attempting to monopolize the U.S. telecommunications industry.

The suit calls for AT&T to divest itself of Western Electric and to give up either a number of its 23 regional telephone companies or the bulk of its long-distance telephone business.

AT&T is discussing appealing the case to the Supreme Court — but "at this hour" no decision has been made, a spokesman said. Last winter, AT&T went to the Supreme Court and the appeals court on this matter at the same time, but was rebuffed and instructed to follow an orderly legal procedure, he added.

The Justice Department suit, which was initiated almost three years ago, is still two to three years away from the courtroom, according to Philip Verveer, lead counsel in the case.

Verveer is making an effort to prevent the suit against AT&T from becoming as protracted as the one the Justice Department now has under way against IBM.

SBS Being Probed for Antitrust

(Continued from Page 1)

earlier CML Satellite Corp. and, before that, MCI Lockheed Satellite Corp., accordingto an SBS spokesman.

The CID served on IBM asked that it supply all documents that relate to the decision to form SBS; the agreements, contracts or understandings among the participants of SBS; a description of the organizational structure of SBS; plans for deployment of the SBS system; and studies in the possession of IBM which relate to the domestic satellite (domsat) services.

IBM was also asked to produce all documents relating to communications held between employees of IBM and employees of AT&T "regarding any aspect of domestic satellites."

Further, the CID asked IBM for "all studies relating to the possible effect of the availability of domsat services upon any products or services offered or proposed to be offered by IBM."

"We view this immensely broad and burdensome demand by the Department of Justice as completely unwarranted," an IBM spokesman said. "We are considering how we should respond to it."

In a prepared statement, SBS said it "does not expect the [CIDs] to obstruct progress toward establishment of the SBS system." The satellite carrier, which recently won approval of its domestic satellite application from the Federal Communications Commission (FCC), also called attention to attempts by the Justice Department to have the FCC consider competitive aspects of the plan.

The commission determined that "any arguably anticompetitive effects of the SBS system are not likely to occur" because of market structure and the "FCC's continuing regulatory supervision," SBS noted.

The Justice Department spokesman said his department had repeatedly attempted to get competitive aspects considered by the FCC, but the commission determined the domsat service is in the public interest from a communications standpoint.

A spokesman for Aetna said the insurance company finds the demands made by the CIDs "burdensome," but it intends to comply.

The information requested by the Justice Department must be supplied on or before June 30.

Bell Agrees to Buy Others' Equipment

NEW YORK — AT&T, in compliance with an order from the Federal Communications Commission (FCC), will establish a subsidiary to obtain telecommunications equipment from non-Bell manufacturers for use in the Bell System.

The FCC order gave AT&T 90 days to propose changes that would give Bell System companies greater autonomy in selecting their equipment suppliers.

The subsidiary could be operational 12 to 24 months after FCC approval, AT&T said. The unit has yet to be named or its location decided; however, AT&T estimated a staff of about 1,300 would be needed to run it.

The subsidiary will take over most of the responsibilities of Western Electric's supplies purchasing organization, a spokesman said.

AT&T said it is complying with the order even though it doesn't believe the measures are necessary. "It has always been the policy of the Bell System to procure the best available equipment at the lowest overall cost, regardless of the source," the company said in its FCC filing.

On the Inside This Week

NEWS
Afips President Plans to Strengthen Ongoing Projects . . . 4
FCC, AT&T Briefs Support Dataspeed 40/4 Tariff 7
Calendar 10
Employment Outlook 'Guardedly Optimistic': Survey. . . . 11
Changes in Size, Cost Bring Minis Into 'Adolescence' . . . 14
Scrounging Produces Ultralow-Budget Shop 15
Worker Rapport Seen Vital to Success 16
Wide Range of Choices Available in A/V Materials 18
Decentralization Entails Make-or-Break Choices 21
The Waves of Change: A Book by Charles P. Lecht. 22

EDITORIAL
Editorial: NCC and Society 24
Human Connection: Systems Give People Power 25
Taylor Report: Security Designs Protect Programs 25
Conflict Over Structured Methodology Goes On 28
Proposed I/O Interface Standard Will Hurt Innovation. . . 29

SOFTWARE & SERVICES
More Products Reopen World of DOS Enhancements. . . 31
CDC's 'Pallas' Helps Firms Work With Government. 32
1130 Software Runs on DG Gear. 33
Move to Data Base Requires Changes in Philosophy. . . . 34

COMMUNICATIONS
Telenet Unveils Micro Concentrators for Packet Net 39
On-Site Communications Seen Coming Soon 40
T-Bar Expands Net Control Line With Diagnostics. 41
IBM Users Get Gamma Display System 42

SYSTEMS & PERIPHERALS
COM: In-House or Out? Factors Outlined. 43
CPU Compatibility Stressed for Successful DDP Net. . . . 44
COM Option Improves Image 47
Labor Reporting Ranks as Favorite FDC Application. . . . 48

MINIWORLD
GA 440 DS Features Interactive Cobol Capability 49
Small System Helps Food Firm Respond to Change. . . . 50
NCR Turnkey Works for Moving Firms 51

NCC HIGHLIGHTS
NCC to Focus on User, Feature Personal Computing . . P/2
What to Do P/3
Conference at a Glance P/4, P/5
Restaurants. P/6, P/7
Communications at NCC. P/8, P/9, P/10, P/11
Minis at NCC P/12, P/13
OEMs at NCC. P/14, P/15, P/16, P/17
Peripherals at NCC P/18, P/19, P/20, P/21, P/22, P/23
Software at NCC P/25
Terminals at NCC. P/26, P/27, P/28, P/29, P/30, P/31
And Other Things to See P/32, P/33

COMPUTER INDUSTRY
Roth Proposing Cabinet Post for Trade 53
Adapso, Members Sue Citibank 53
BASF to Put Toe in OEM Waters at NCC Next Week 54
Conable Urges Risk Capital Promotion. 55
Data 100 Offering Full Terminal Line. 57
TI Sees Bubbles Good Mass Memory in '80s 59
Distributor Sues Cincom for $4.4 Million. 60

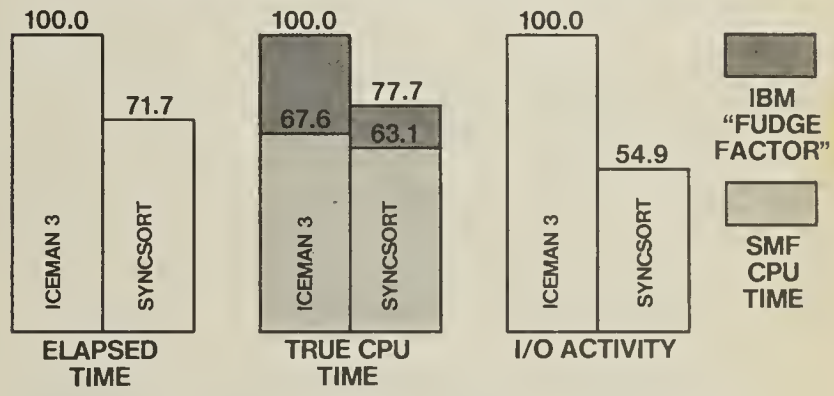
NOSTALGIA

After testing IBM's new sort in VS, we know who the kid reminds us of!

(SyncSort—a few years ago.)

We've just finished testing IBM's new SM1-5740, Release 3, against SyncSort III-and-a-half in VS. And it turned out to be quite an experience! A little like looking in the mirror and seeing ourselves as we were a few years ago.

Not that the results of the tests themselves were surprising. *ICEMAN 3 didn't do much better in VS1 and SVS than it did in the earlier MVS tests.* The charts below bear that out:



In fact, ICEMAN 3 wouldn't have done as well as it did if IBM hadn't supplied its own "scorekeeper" in the form of SMF. As you probably know, SMF tends to be a little myopic, particularly where IBM sorts are concerned.

In VS, for example, SMF records only a portion of the True CPU Time that a sort consumes. The unrecorded remainder is lumped together in an amorphous package we refer to as the "IBM Fudge Factor." As a result, SMF has a lamentable tendency to score sorting errors as hits — and *vice versa*.

But what really floored us during the VS tests was a very strong sense of *deja vu* — of having been there before. We finally figured out what caused it: *ICEMAN 3 bears a striking resemblence to our old SyncSort II.*

Some of you who've been around awhile will remember that we brought out SyncSort II a few years ago as the answer to IBM's SM1-5734. And for a stretch there SyncSort II was king of the hill — the most advanced sort of its day.

The Computer Giant countered by introducing SM1-5740. It was accompanied by much hoopla and glowing references to "sophisticated I/O techniques, PCI's, PEER for pre-sequenced data" and so forth.

The trouble was — for SM1-5740 anyway — that we brought out several new versions of SyncSort during that period.

And before long those "sophisticated I/O techniques, PCI's, etc." began to fall from grace.

Now, wonder of wonders, IBM brings out ICEMAN 3, which skips back over all those generations to SyncSort II. In the meantime, here we are, coming out with new techniques that are going to make ICEMAN 3 even more outmoded than it is today.

If IBM keeps on in this vein, they're going to re-invent the roundest wheel of them all! But anyway we'd like to thank them for one thing:

Taking us back to the days of our youth!

Call (201) 568-9700

Find out what lies *ahead* in sorting.

OVERSEAS REPRESENTATIVES —

Brussels: CAP/GEMINI/CES
Dusseldorf: CAP/GEMINI GmbH
Geneva: CAP/SOGETI
Hague: CAP-GEMINI/PANDATA
Johannesburg: Computing Benefits, Ltd.
London: GEMINI Ltd.
Melbourne: Shell Co. of Australia
Milan: SYNTTAX
Paris: CAP/SOGETI PRODUITS
Sao Paulo: Deltacom do Brasil
Stockholm: BRA
Tel Aviv: ADVANCED TECHNOLOGY, Ltd.
Vienna: Ratio

WHITLOW COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Sees Federation as 'Binding Force'

Afips President Plans to Strengthen Ongoing Projects

By Ann Dooley
Of the CW Staff

NEW YORK — Ted Williams, current president of the American Federation of Information Processing Societies (Afips), plans to "carry the flag" for his predecessors by strengthening ongoing projects and maintaining Afips resources where they are needed most.

In a recent interview here, Williams said he believes his most important goal as president is to effectively implement and follow through on specific projects begun by George Glaser and Anthony Ralston.

The Afips projects Williams sees as needing guidance and support include the newly expanded Washington, D.C., office, the Afips periodical study and the Long-Range Planning Committee.

The Washington office was established to keep pace with events in the Capitol and to relay that information to Afips' member societies — not to lobby Congress. Another staff person was recently added to help keep up with the information flow, Williams said.

The Afips periodical study is still in the midst of a feasibility study to see if the DP community could benefit from a nontrade publication, "something on the order of *Scientific American*," Williams said.

The third project, the Long-Range Planning Committee, is in the process of making recomendations on Afips' role now and where it should be going, he said. The committee is also studying solutions for finances and member communication and interaction.

Williams is a friendly, soft-spoken man who considers Afips the "binding force in a computer field of disparate missions."

He is a professor of engineering and director of the Purdue Laboratory for Applied Industrial Control at Purdue University.

In addition, Williams has written 10 books and over 200 technical papers in scientific and engineering journals.

A member of the DP community for nearly 30 years, Williams is ambivalent about the issue of professionalism. The industry can best prove its professionalism by the service it performs, he said.

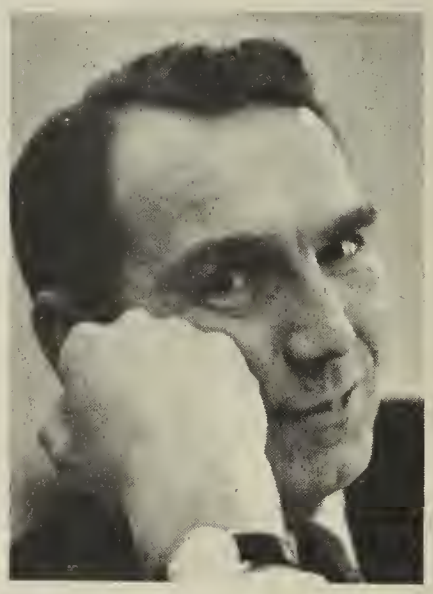
He also admitted having mixed feelings about licensing. "I've been licensed for 20 years and haven't needed it," he stated.

Training Problem

Williams is aware of and concerned about the training problem within the computer industry. Universities can't be expected to become trade schools, but some compromise should occur, he indicated.

"Computer science students should be given some specialized training that will also be practical in a working situation," he said. "Cooperative programs are the best, buf many students don't want to spend that long in school."

Williams attributed the boom in the DP field to "computerized automation." There has been a 15% to 20% yearly growth be-



Ted Williams

cause of industry automation, he noted.

However, he refuted the idea that computers are replacing low-level workers. "There has never been any substantiation of computers causing permanent unemployement," he said. There might be short-term dislocation, but DP creates more jobs in the long run, according to the former president of the American Automatic Control Council.

The father of two daughters who sometimes accuse him of being "old-fashioned," Williams believes women are entering DP and being promoted faster than ever before. "Women have our cooperation in the industry," but they must be trained, he said.

A woman Afips president, for example, must be qualified, and realistically, there are only a few around, he added.

Williams feels microcomputers will become commercialized soon for such uses as air conditioning and police alarms. "It's a matter of cost," he said.

One of Afips' most important functions is conducting the National Computer Conference (NCC), according to Williams. "We're working all the time to make [the] NCC a more viable force in the field."

And Afips draws its largest source of operating funds from the annual NCC surplus funds. The surplus is divided among Afips and its four principal constituent societies.

Last year Afips received over $250,000 or 50%, of those funds. The rest was divided almost evenly between the Institute of Electrical and Electronics Engineers, Inc., the Association for Computing Machinery, the Data Processing Management Association and the Society for Computer Simulation.

NOVA/ECLIPSE/PDP-11 Users

FORTRAN DEBUGGING with TRACER

TRACER is a fully symbolic, high-level debugging tool for Fortran Programmers which offers these advantages:

- displays values as they change, statement labels when executed, subroutines when called, etc.
- eliminates machine language considerations thereby reducing programmer effort
- speeds debugging
- increases programmers productivity
- reduces need to expand facilities and staff to increase program development

Available Now - $1200.

TRACER is one result of Information Processing Techniques continuing effort to provide program development and debugging tools for minicomputer users.

Call or write:
Information Processing Techniques Corporation
2462 Embarcadero Way, Palo Alto, CA 94303
(415) 321-6284

Terminal response time diagnosis.

If you suspect response time problems, find out for sure. Get the real response time with a TERMINAL RESPONSE TIME MONITOR. This is a hardware monitor that measures the average, minimum, and maximum response time along with the number of transactions. Terminal connection is by optical coupler which eliminates internal probe points. Operation is unattended and automatic. **Price: $950.**

For more information contact: QUESTRONICS, INC.
3596 South 300 West
Salt Lake City, Utah 84115
(801) 262-9923

Visit us at NCC Booth No. 1645

Forrester to Be Honored at NCC

DALLAS — Jay W. Forrester, known even to laymen for his work in computer modeling and analysis of social systems, will be presented with this year's Harry Goode Memorial Award on Tuesday, June 14 at the National Computer Conference here.

Forrester, who is the Germeshausen Professor of Management at MIT, will be honored for his pioneering in the development of random-access, coincident-current magnetic core storage, which has been widely used as a memory device for digital computers.

He is also being cited for his contributions in the design and construction of Whirlwind I, one of the first high-speed digital computers, and for his achievements in the development of computer modeling and simulation techniques.

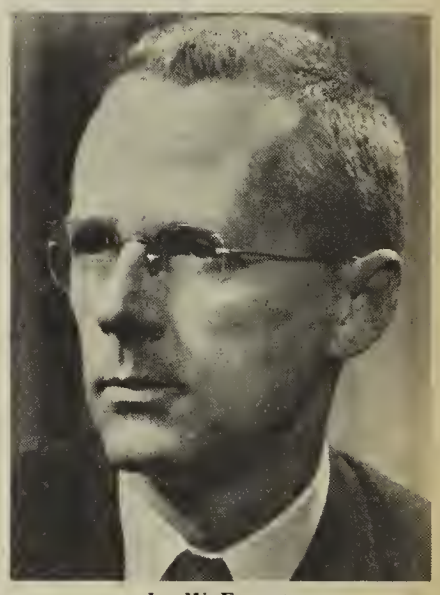
Also mentioned by the American Federation of Information Processing Societies (Afips), in announcing the awards, were his leadership in the development of the field of system dynamics, and his many additional contributions to the development of information processing, its applications to social systems and the dissemination of information on such developments through a series of papers and books.

Forrester is the 14th individual selected by Afips to receive this award — an honor that was established in 1964 to cite individuals who have made extraordinary contributions to the development of computer science and information processing.

Since 1956, Forrester has been applying his background in computer science and engineering to the development of computer modeling and analysis of social systems — an endeavor that led to a field now known as "system dynamics."

In recent years, Forrester has published papers describing his work in developing a comprehensive simulation model for studying the forces underlying inflation, unemployment, energy shortages, foreign exchange rates, mobility of people and tax policy.

Prior to 1956, Forrester was head of the Digital Computer Division of MIT's Lincoln Laboratory where he guided the planning and technical design of the Air Force Sage system for continental air defense, which is considered one of the most extensive early applications of digital computer technology.



Jay W. Forrester

Among the books published by this year's award winner are *Industrial Dynamics, Principles of Systems and Urban Dynamics, World Dynamics* and, most recently, *Collected Papers.*

Honors Received

Forrester has been the recipient of many other national and international awards and honors, including Inventor of the Year from George Washington University; the Valdemar Poulsen Gold Medal from the Danish Academy of Technical Sciences; and the Institute of Electrical and Electronics Engineers' Medal of Honor as well as its Systems, Man and Cybernetics Society Award for Outstanding Accomplishment.

A 1939 graduate of the University of Nebraska, with a B.S. degree in electrical engineering, Forrester received an M.S. degree in electrical engineering from MIT.

He holds honorary doctorate degrees in engineering from the University of Nebraska, Newark College of Engineering and the University of Notre Dame, in addition to honorary degrees in science from Boston University and Union College.

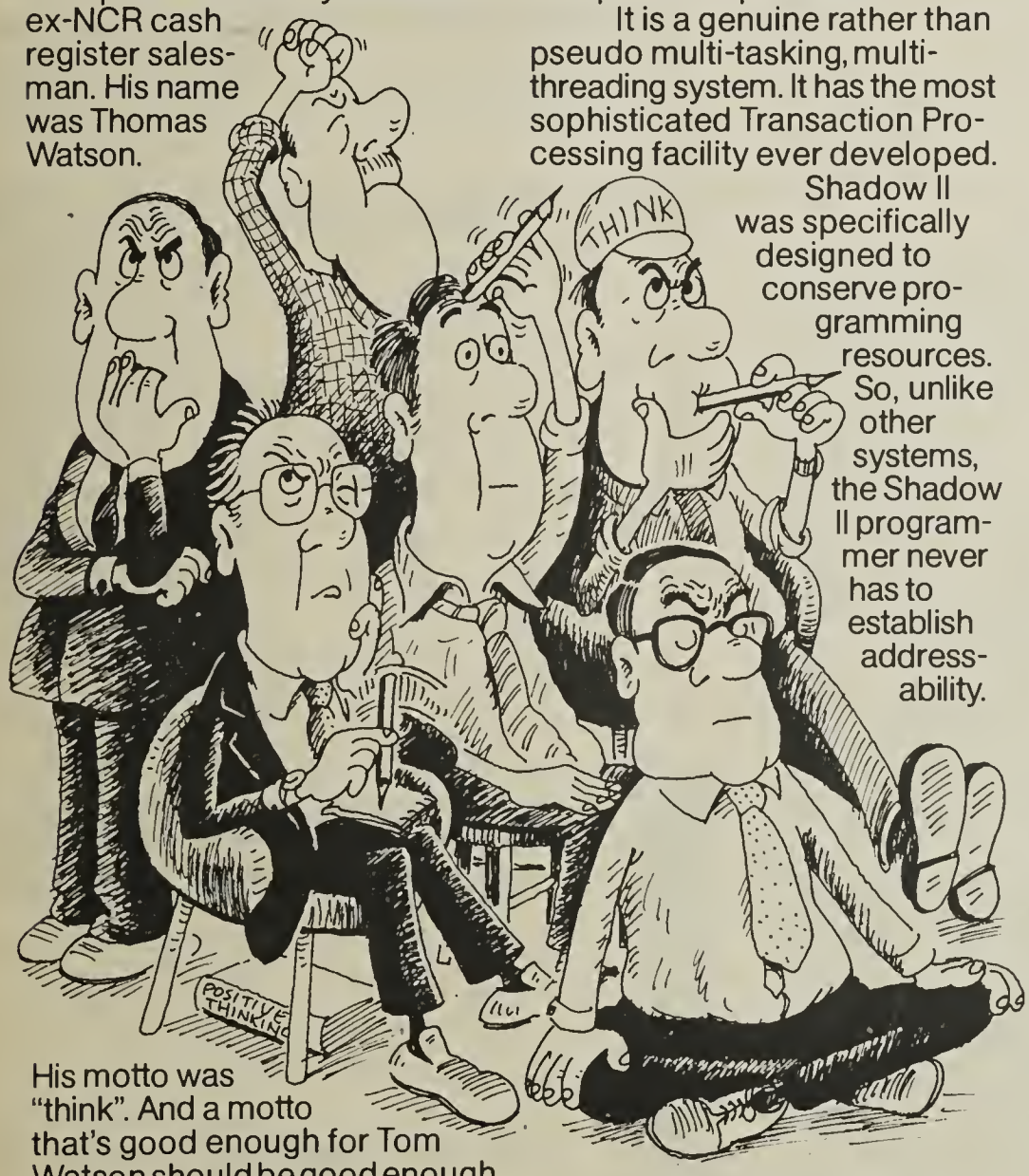
Tom Watson said "Think." So we did.

IBM is a very remarkable company.

It's the seventh largest industrial corporation in the world. More than half of its quarter of a million employees are university graduates.

IBM, whether one likes it or not, produces the world's finest computers.

The company was created in its present form by a Scottish ex-NCR cash register salesman. His name was Thomas Watson.



His motto was "think". And a motto that's good enough for Tom Watson should be good enough for anyone.

So when Altergo set out to create an entirely new TP monitor they did a lot of "thinking".

The result is Shadow II. Today it's brand leader in the very tough European market.

The result of six years' continuous development it has major advantages over its competitors.

For starters it takes just twenty minutes to install. As opposed to the days or weeks it takes to get some of its competitors operational.

It is a genuine rather than pseudo multi-tasking, multi-threading system. It has the most sophisticated Transaction Processing facility ever developed.

Shadow II was specifically designed to conserve programming resources. So, unlike other systems, the Shadow II programmer never has to establish addressability.

Shadow II provides high-level Cobol verbs and Assembler or PL/1 macros for use with either of these languages.

Because Shadow II provides so many more pre-written facilities the coding is far less complex than with other systems.

Shadow II can also save the IBM TP user between 25% and 75% of his main memory and CPU time requirements compared with any other system.

Terminal response times will always be faster with Shadow II – sometimes by a factor of three or four. There are many reasons for this, but one of the more important is that Shadow II provides users with unique high performance access methods to terminals and files rather than using antiquated IBM modules.

In brief, Shadow II is the fastest, most cost-effective and easiest to use TP package in the world.

So, to quote old Tom again, we hope we've given you cause to "think" - about your TP requirements.

Altergo Software Inc.,
Wellesley Office Park,
20 William Street, Wellesley,
Massachusetts 02181.
Telephone: (617) 237-6132
(617) 237-6332

Dear Altergo, you've given me food for thought. Send me the Shadow II information right away

Name

Responsibilities

Organisation

Address

Zip Phone

IBM computer Op system

Present TP package

My requirement is immediate ☐ within 6 months ☐ more than 6 months ☐

MMR

Shadow II

The World's most advanced TP Monitor

Study Recommends Users Pursue Only Critical Errors

(Continued from Page 1)

additional actions does it take to supplement hardware error checks with software checks of its own?

Further, are actions taken in a timely manner so errors do not propagate outside the system or cause secondary mistakes that are difficult (costly, time-consuming) to reverse? Patrick asked.

The third stage relies on checks built into applications programs to weed out any context-dependent errors, prevent propagation and preserve the integrity of the entire system, including both programs and data.

The final stage is the man-machine interface. Since some errors cannot be automatically recognized (much less automatically corrected), what information is made available to the human operators of the system?

Is it in a useful form, is it timely and are manual procedures in place to respond quickly so processing can continue? the author queried.

In the early '60s, at least one computer was designed that was thoroughly checked, Patrick said. Although he did not mention it in the study, Patrick confirmed he was referring to IBM's 1410.

Parity was established by redundant card reading stations and verified when data reached the CPU. Checking was performed on all transfer operations such as register to memory, memory to register and the like.

Parity was stored with data in memory and there was an unbroken chain of checking from the CPU registers out through the channels to the tapes and disks and back again.

Checking also went out to the printer, but stopped short of the print hammers, Patrick reported.

Most recently built computers have been "only partially checked. One senior designer informed me that a CPU could be fully checked by increasing the CPU circuit count only 10% to 15%," Patrick said.

"However, in the pursuit of lower prices, the manufacturers have convinced themselves that partial checking (i.e., memory, but not CPU) is adequate and hence the machine with an unbroken checking trail is a thing of the past," he charged.

Specific Recommendations

As a result of his literature search and field research, Patrick put forth 10 specific recommendations, which, if adopted, would affect the information systems purchased by the U.S. government.

Patrick suggested that the NBS:

- Require each full-line manufacturer to certify the degree of checking built into its hardware.
- Require each processor manufacturer to describe the arithmetic singularities in its product as an appendix to the programmer's manual.
- Require each vendor supplying mathematical software to certify the accuracy of the numerical approximations used against an established national standard. This certification should appear as an appendix to its programmer's manual.
- Encourage manufacturers to certify the degree of checking in their software systems.
- Collect a complete list of numerical hazards and publish a document showing numerical analysis difficulties a mathematical/scientific/engineering programmer should be cautious to avoid.
- Launch a study to evaluate development methods in practice today.
- Publish a series of best practices manuals designed to raise the average level of programming practices throughout the industry. Manuals should cover file design, error control, editing and the management of development.
- Publish another series of best practices manuals to raise the average level of operational practice throughout the industry. Manuals should cover machine operation, audit trails, production control, management of change and the systems and procedures efforts that control the processes adjacent to the computer.
- Select portions from the best systems found and synthesize a model system which demonstrates a consistent approach to error control.

The study, although commissioned by NBS, is not binding upon the bureau, which can accept or reject the study or any part of it.

If accepted, it will be published as part of the NBS Special Publications series.

Five Maryland Banks Pilot Ambitious EFT Switch

(Continued from Page 1)

bank cards, check-verification and guarantee services, balance inquiry and data capture at the point of sale.

The banks are starting with credit cards because there is a large pool of cards already in circulation, but they will be moving into debit cards as well, Abouchar stated.

The system is working extremely well in its first month of operation, according to Norman Foster, senior vice-president of First National Bank of Maryland and president of Maryland Switch.

First National has 10 terminals in operation, IBM 3606s and 3608s as well as one Touch-Tone phone, he said.

Volume has been low since the switch went operational April 4. Foster estimated the volume at about 1,500 transaction/mo, but noted it is in part a result of the low number of terminals installed (19) and the fact they are limited to one service.

In addition, that service is limited to the bank that owns the terminals, he said, adding he expects the volume to increase substantially as terminals become shared.

Fees for the services are determined by each bank which does its own marketing, Foster said. Maryland Switch only charges a fee for each switching transaction.

Each bank will continue to operate its own data base, he indicated. Maryland Switch will only route the transactions, compile statistics, do intermember billing and be the maintenance factor for the network.

Foster expects about 125 terminals will be in operation by July 31. These will run for three months and then "the gate's open," he said.

While the banks have not done any extensive research on consumer acceptance of the switching operation, Foster indicated all of the banks have automated teller machines (ATM) deployed and have garnered quite a bit of experience from consumer acceptance of these.

"And we feel this is just an extension of that as far as acceptance is concerned," he said, noting the ATMs may eventually be hooked into the switch either through the back end or the front end.

Xerox Printer Uses Plain Paper

(Continued from Page 1)

and operator control and communications. It includes an internal Digital Equipment Corp. PDP-11/34 minicomputer with 32K words of memory that can be configured with up to 64K words.

Other control system hardware includes a disk drive with a storage capacity of approximately 26 million bytes, a character dispatcher, the output device controller and the operator's console.

The control subsystem can accept information from an on-line IBM 360/30 and larger CPU or a 370/135 and larger CPU. Off-line, it accepts input from 1,600 bit/in., 9-track magnetic tape in Ansi formats.

All incoming information is preprocessed on the PDP-11/34, then buffered on the disk, Xerox said.

The imaging subsystem generates the pattern of modulated laser light that creates a latent image of the page on a photoreceptor belt. The xerographic subsystem includes the paper-handling mechanism and the facilities for development of the latent image and its transfer to the paper.

Paper is moved from the input stations in a path past the photoreceptor belt, where the image is transferred to it; through the fusing area, where the charged toner particles are fixed to it; and then to the output stackers.

A basic system will rent for $5,300/mo on a one-year lease with a charge of 3.5 mills per page. It can be purchased for $295,000.

Deliveries of the unit, which will be on display at the National Computer Conference, will begin in the third quarter of 1978.

When time is of the essence...

Now you can get on line quickly, and handle your data processing needs fast, on CUC's totally IBM-compatible Amdahl 470-V6 4 meg computer.

A comprehensive array of support systems include:

SVS—An operating system that gives you the advantages of virtual processing.

WYLBUR—A highly responsive text editor, program development aid and job entry sub-system.

MASKGRAF and MICROGRAF—Our electronic engineering program services provide on-site automated layout and plotting with 30 cps print/plotters and CALCOMP plot data files.

Others—MARK IV, LIBRARIAN, PMS, GPSS, and RJE support systems.

All standard compilers are available.

CUC services are available nationwide through 4,800 baud dial-up or a 30 cps network. Whether you're looking for new computer services, expansion of your present facility, or need more program development time, you'll find CUC ready to serve your individual needs.

Phone Customer Services collect for more information and/or a free benchmark . . . TODAY.

Call CUC!

Computer Usage Company
1105 Kern Avenue, Sunnyvale, CA 94086
(408) 738-4300

Hardware & Software Mini-computer • DISTRIBUTORS • DEALERS

MINIMIZE YOUR INVESTMENT— MAXIMIZE YOUR PROFITS!

NCE Computer Systems, Inc. is now looking for Distributors and Dealers for our line of mini-computers. Hundreds of these units are already operating successfully, but we've barely tapped the potential.

We offer Distributors and Dealers many benefits in handling our line, including:

- Leasing available, to you *and* your customers
- Fast delivery—within 30 days
- Small or large volume orders accepted
- Our low overhead means you buy low, have more room for markup
- Personalized service and fast response to your needs—regardless of where you're located

Don't wait! Call us now (or fill out the coupon below), for full details!

NCE NCE COMPUTER SYSTEMS, INC.
An NCE Group Company
1536 Brook Drive, Downers Grove, Illinois 60515 In Illinois, call 312-629-7810
Out of state toll free number: 800-323-1780 (8 A.M. to 6 P.M. Central Time)

O.K., NCE, send me complete information on how I can become an NCE Distributor or Dealer, at no obligation to me.

Name _____ Phone _____
Address _____
City _____ State _____ Zip _____

FCC, AT&T File Briefs Supporting Dataspeed 40/4 Tariff

By Molly Upton
Of the CW Staff

NEW YORK — The Federal Communications Commission's (FCC) decision to tariff AT&T's Dataspeed 40/4 as a communications device was proper, according to briefs filed by the FCC and AT&T with the U.S. Court of Appeals here in the case of IBM et al vs. FCC.

In response to the briefs by IBM and others asking that the decision be reversed [CW, May 9], the FCC maintained its order should be affirmed. AT&T, an intervenor in the suit, filed a similar brief, but asked only that the court deny those petitions asking for a reversal.

The suit was filed by IBM, the Computer & Communications Industry Association and the Computer and Business Equipment Manufacturers Association after the FCC declined to investigate or suspend the tariff.

The issue of whether AT&T should be allowed to market its 40/4 has been controversial since the device's inception. Even the FCC has come to different conclusions.

Initially, Walter Hinchman, chief of the FCC's Common Carrier Bureau, ruled the 40/4 was a DP device and thus could not be marketed by AT&T on an interstate basis under the terms of the First Computer Inquiry rules. These rules prohibit AT&T and other common carriers from offering DP equipment except through arm's length affiliates.

But a vote of the commission overturned that decision, opening the way for AT&T to market it. However, in its ruling [CW, Dec. 6], the FCC indicated its decision was contingent upon future findings in the Second Computer Inquiry being conducted under its auspices. Filings in the second Inquiry are due today.

Proper or Improper?

The petitioners had argued the FCC decision was improper because the Dataspeed 40/4 is a DP device.

Both AT&T and the FCC agreed the FCC's decision was proper because the 40/4 did not violate the Computer Inquiry rules and it was a communications device that could be lawfully tariffed under the Communications Act.

They also argued the FCC properly accepted AT&T's submitted material and correctly declined to investigate or suspend the tariffs.

Much of the argument focuses on whether the Dataspeed 40/4 is a DP device, according to the interpretation by the First Computer Inquiry.

The controversy is whether the Inquiry intended only to prohibit common carriers from providing a central computer for use in DP, as AT&T and the FCC contend, or whether it intended for its rules to cover forthcoming developments such as distribution of DP capabilities.

IBM and its copetitioners construed the Inquiry's rules as intending to prohibit carriers from providing both those devices included in the central CPU as well as those remote from the CPU.

Thus, they would have preferred the FCC to analyze the 40/4 in conjunction with a computer as an integrated system.

The FCC's brief argued that its decision to tariff the 40/4 had properly interpreted the Inquiry rules as "intended to restrict only offerings of DP capabilities of a carrier's central computer and not carrier offerings of terminals designed to communicate with computers.

"If the commission had intended to prohibit anything beyond 'use of a computer' [such as the offering of terminals designed to interact with computers], it would have delineated that, too, as unambiguously as language permits," the FCC brief continued.

"Apart from the Computer Inquiry rules, the functions performed by Dataspeed 40/4 constitute an integral part of communication as defined by the act and can be offered pursuant to tariff under the act," AT&T's brief added.

The FCC brief denied the petitioners' claims that it misconstrued the regulatory intent underlying its computer rules.

IBM and the others had argued that because the Inquiry defined remote-access DP service, the rules prohibited carriers from providing any customer terminals designed to access a computer, according to the FCC brief.

'Unsupportable Contortion'

"This conclusion is a totally unwarranted and unsupportable contortion of the plain meaning of the rules," the FCC charged.

"Review of the Computer Inquiry orders reveals no mention of any intent to prohibit carrier offerings of remote access devices in conjunction with transmission lines," the FCC continued.

In support of its argument, the FCC pointed out AT&T has offered teletypewriters for some years.

The commission was correct in refusing to extend "preemptively" its computer policy to bar the Dataspeed 40/4 offering, the FCC noted.

The FCC "must make its determinations on the basis of existing rules and public interest findings, regardless of the fact it may be considering a modification to those rules in another proceeding," the FCC brief stated.

On another point, the FCC indicated the constraints imposed by its maximum separation policy are not applicable since it specifically found the 40/4 to be a communications device.

Success of DP in Corporation Equated With Its Invisibility

By Ann Dooley
Of the CW Staff

NEW YORK — Success in data processing is achieved when DP has become so integral to the corporate environment it is no longer even noticed, Charles Lecht, president of Advanced Computer Techniques (ACT) told a *Computerworld* Computer Caravan audience here recently.

Over the ages, every advanced technique has come in as a fad and then slowly become commonplace. As it is spread throughout the system, innovations rapidly become unimportant, he said.

By the 1980s, computer technology, as we know it, will have changed dramatically, he forecast, and DP managers will continue to bear the brunt of change.

DP managers live delicate lives, he said. "I tell managers just to assume hatred from all directions."

Managers should consider themselves "in a war," he advised. "Build yourself a bunker to stay in and get a good cadre of soldiers who will go down before you."

Lecht told his listeners that the only way to determine if an employee is productive is to give him more and increasingly harder jobs to see if he can do them. "Just watching is not enough," he warned.

Productivity is not distributed across time. Sometimes there will be results, but too often there won't be anything visible to hand over, he said.

As for the growing interest in minicomputers and distributed processing, Lecht said the rush to minicomputers might not be the answer for everyone. "Can five midgets do the same as one tall basketball player?" Lecht asked his audience. It's a difficult question to answer, he said, because the emphasis within the DP industry has shifted.

Centralized processing is a better system than a distributed one, Lecht continued. "If you can't control things in one room, why could you control it in 15?" he asked.

However, if it is successful in one room, it could be slowly expanded to others. "Otherwise, it's best to contain incompetence" rather than "disperse it," he said.

DPers have grown up with the notion only certain people should have all the facts and management is usually not one of them. "We'll decide what is to be done and then let them know what we want them to do" is the usual attitude, Lecht said.

Programmers, in addition to management, are often kept in the dark, he said. Programmer groups lack awareness; they don't know their overall purpose or where they stand in the corporate environment, he said.

For maximum productivity, programmers should be managed within a mission environment, he advised. When a project is completed, the group should be disbanded and reassigned.

For highest productivity, a manager must be "scrupulously honest" with his staff, Lecht advised.

DP managers and the company stand on a "floating platform" because there are no such things as hard and fast "specs," he warned.

Packages are a good way to go, but are likely to cost two and a half times the cost of the original price because of modifications and installation.

"Cobol is not a natural language," Lecht said, adding Cobol is on the way out.

Philatelic Honor Planned for NCC

DALLAS — The 1977 National Computer Conference slated here June 13-16 will be honored with a special postal cancellation to be used during the four-day conference.

The cancellation depicts a computer terminal showing the standard circular date stamp on its face and a punched card that reads "1977 National Computer Conference, Dallas, June 13-16."

The cancellation was designed by this year's NCC program chairman, Dr. Robert R. Korfhage, professor of computer science at Southern Methodist University (SMU), who is a member of the Dallas Philatelic Society.

The cancellation and cacheted envelopes cost 25 cents and can be obtained by contacting Korfhage at the Department of Computer Science, SMU, Dallas, Texas 75275.

Proposal Book Sales Soar!

Skyrocketing sales of a *how to* manual on proposal preparation indicate a probable best-seller for Mercury Communications, Inc. Written by two highly-experienced proposal consultants, *How to Create a Winning Proposal* is rapidly becoming the standard text for use in government, commercial and OEM proposal efforts. The book is suitable for hardware, software and service companies alike, and is a boon to anyone doing business with GSA, DOD, NASA, HEW or other government/military agencies.

Using a step-by-step instructional technique, the authors provide a virtual roadmap to the entire proposal process . . . including technical, cost and management section checklists to ensure the proposal team of covering all the important bases. Excellent guidelines are given on the contents, structure and methods of preparation for both solicited and unsolicited proposals. A tactical approach is used for developing an effective "win strategy" mobilizing the proposal team and controlling the input of the various team members.

Government requirements are covered in an overview of the U.S. procurement network, how it works, and how the proposing firm can increase its "win probability" in competing for prime and subcontracts. Detailed instructions on how to analyze and respond to RFP's, RFQ's and IFB's are included.

Copies of *Winning Proposal* are available pre-paid only from Mercury Communications, Inc. 730-CW Mission St., Santa Cruz, CA 95060. $55 includes 3-5 day delivery inside USA. In Calif. add $3.12 sales tax.

ssa?

If the one-dollar-a-day-per-employee, IRS penalty for late filing of ERISA form SSA, has you worried, better call Joe Nestor at Wang Laboratories, Incorporated, Lowell, Massachusetts (617) 851-4111.

He will tell you how a Wang ERISA Compliance Software System can provide the SSA, as it helps you meet your pension, profit sharing or stock plan, data keeping requirements.

WANG

Do you qualify to tour one of the most secret DP centers in America?

Fewer than 50 NCC Conferees will.

In July of 1975, *with a spectacular absence of fanfare, Sun Oil Company opened one of the most sophisticated, secure, and reliable DP centers the world has never seen. At first two, now three, IBM 168's serve a network of more than 400 terminals from LA to Bermuda.*

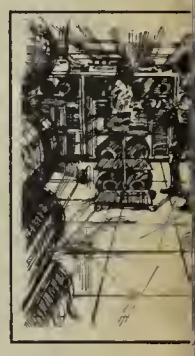
With the formation of Sun Information Services, that center is now commercially available. And, for the duration of the NCC, open for inspection by qualified prospects.

The Sun National Computer Center. So secret even a Dallas cabbie couldn't find it.

No signs... one good way to protect secret DP information is to build a "fortress". But another is to be inconspicuous. Remarkably, our Sun Center accomplished both. For instance, there are no exterior signs for identification. Even cab drivers often mistake it for "just another office building." Yet inside...

No access... without authorization. Five separate clearance levels isolate vital sections of the center. Sensitive areas are monitored by (you guessed it) a computer which "reads" special, light-through, optic-density badges. That same computer helps security staff be certain there are...

No intruders... at any given time, the security guard at his terminal, and the computer can determine exactly who is in the center and where. Closed circuit TV cameras (they're even equipped with windshield wipers) monitor entrances. But then, there are only two doors and...



No windows... at least none visible from the outside-in. But every interior view looks out upon a courtyard that's shielded from the "curious" by brick panels. It's an unusual architectural/security precaution taken despite the fact that there is...

No "traffic"... because nearly all processing is done from remote job entry, there's no security threat posed by people showing up on our doorstep with batch material. But even if some unauthorized person should gain entry to level 1 there are...

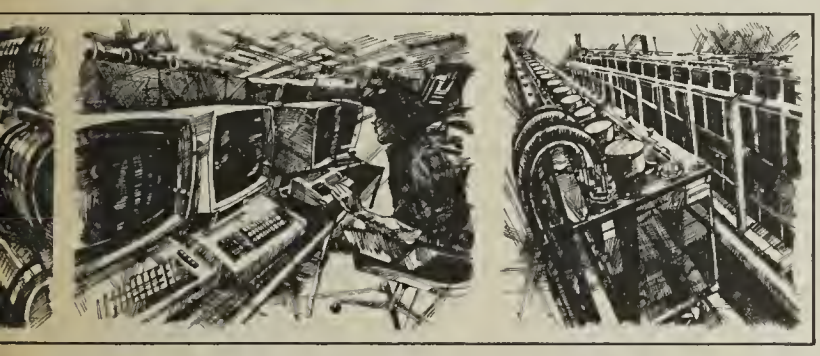
No labels... all stored data is assigned a secret number. That's all. No name. No symbol. Only the computer knows which number belongs to whom. So in effect, no one in the

building — authorized or not — knows what's on a tape, or whose it is. To get your tape, a spy would have to steal and play back all 70,000, and then do some pretty fancy guessing.

Built to keep the roof from falling in on your business.

Fact: use most outside computer services and you're vulnerable to loss. Because natural disaster to your supplier can mean financial disaster to you. What to do? Trust a building that minimizes even the potential for loss through extraordinary engineering features.

Framed in concrete... experts will tell you the worst and most common damage a building (and its contents) can suffer is a collapsed roof. Our Dallas Center was specially designed to avoid that possibility. Entirely framed in reinforced concrete, the sides are not load-bearing, but rather...



"Blow-out" brick panels... these quick-release walls would be the first to go in the event of catastrophic structural pressure (like a tornado). Their presence means that even if the center should be hard-hit, our recovery time would be considerably faster.

60 ft. pylon foundation for earthquakes that don't happen... The point is: we went to great lengths (and depths) to cover contingencies — even tremors in a non-quake zone.

Reliability? Learn how we achieve a near-perfect uptime rate.

During April, for instance, the Sun Center maintained an uptime of 99.1%. And, we had an average record of 67 hours between failures. Pretty impressive. Compare these figures to your present source — inside or out. How do we do it? Here are two things to look for when you tour.

We can locate line trouble in precious minutes. The exclusive remote circuit test panel. Most regular on-line users face this frustration: The communications break that costs hours of recovery. Line checks and rechecks are carried out...then, typically, none of the parties down the line want to claim responsibility. But with Sun's remote circuit test panels, the break is located and by-passed in minutes, not hours. So you're never out of business for extended periods. See how it operates, then compare it to the system you use now or would like to use.

Sun-designed UPS significantly reduces odds against a hard shut down.

Engineers being cautious as they are, we couldn't get ours to come right out and claim an uninterrupted power supply superior to any in the country. But just talk to one about our Dallas Center and listen for the pride and self-assurance in his voice. No wonder. At a cost of more than one and a quarter million dollars, we've installed as near-perfect a system as you're likely to find. All center power passes through storage batteries which help control power surges and eliminate "lag" if external power failure forces us to shift to our two huge diesel generators. Beyond the diesels are additional fail-safe systems you'll find equally intriguing should you qualify for a visit.

Why we've opened up.

When the decision was made for Sun Information Services to enter the commercial market, one of the world's top 15 companies of its kind was born. Still, we know we have to prove we deserve your business.

Quite simply, the NCC gives you a superb opportunity to compare Sun's services and features with your present source.

So, look over what we have...

A sample of services: NIS ☐ Remote Batch Timesharing ☐ Facilities Management ☐ Telecommunications ☐ Consulting ☐ Support

A sample of applications:

Financial: We don't just offer accounting/payroll, cost control, financial modeling, etc., we excel at them.

Operations: With special strengths in process control, inventory control and scheduling.

Technical: We can demonstrate superior capabilities in: chemical, mechanical, civil and structural engineering, plus architectural and construction applications, project management, and linear programming.

Highlights of unusual expertise: ABT (Automated Bulk Terminal) ☐ Telecommunications IMS ☐ Micro-graphics (COM, document filming)

Then, visit us. NCC Booth 2070

For sure, you'll have the opportunity to talk over your needs with some of the most knowledgeable people in the industry. And, quite possibly, you'll get to see our center.

Sun Information Services: A big, sudden source of help.

Sun INFORMATION SERVICES COMPANY

680 EAST SWEDESFORD ROAD ☐ WAYNE, PENNSYLVANIA 19087 ☐ 215-293-0660

We've opened the doors to 20 years of experience.

Calendar

June 6-9, Los Angeles — **International Magnetics Conference.** Contact: Institute of Electrical & Electronics Engineers, 345 E. 47th St., New York, N.Y. 10017.

June 12-14, Washington, D.C. — **Future Directions in International Telecommunications**, sponsored by Arthur D. Little, Inc. Contact: Arthur D. Little, 25 Acorn Park, Cambridge, Mass.

June 14, New York — **Conference on Distributed Data Processing in Banking**, sponsored by Bank Administration Institute. Contact: BAI Meeting Services Division, P.O. Box 500, Park Ridge, Ill. 60068.

June 19-21, Andover, Mass. — **Telecommunications — An International Perspective**. Contact: Richard D. Murray, Director of Conferences, Institute for Graphic Communications, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

June 21-23, Andover, Mass. — **Update on Optical Communications**. Contact: Richard D. Murray, Director of Conferences, Institute for Graphic Communications, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

June 22-24, San Francisco — **1977 Joint Automatic Control Conference,** Contact: Society of Manufacturing Engineers, 20501 Ford Road, P.O. Box 930, Dearborn, Mich. 48128.

July 6, Tysons Corner, Va. — **National Capitol Area of Computer Measurement, Inc.'s conference, NCACMG-IV.** Contact: Robert P. Garrett, USA Milpercen, Alexandria, Va.

July 6-8, Chicago — **Consumer Collection Strategies & Techniques**. Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

July 11-13, Washington, D.C. — **Distributed Data Processing**. Contact: Department PR, AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

July 11-13, Madison, Wis. — **Surge Protection of Electronic Equipment.** Contact: Willis F. Long, Department of Engineering, University of Wisconsin-Extension, 432 N. Lake St., Madison, Wis. 53706.

July 20-22, San Francisco — **Manufacturing Data Systems**, presented by the American Institute of Industrial Engineers. Contact: AIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

July 24-47, Washington, D.C. — **Equipment, Supplies and Services Exposition,** sponsored by OCR Users Association. Contact: OCR Users Association, 10 Banta Place, Hackensack, N.J. 07601.

July 24-29, Geneva, N.Y. — **1977 Symposium for Innovation in Measurement Science.** Contact: Peter Vestal, Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222.

July 25-27, Athens, Greece — **23rd International Meeting of the Institute of Management Sciences.** Contact: Joe Behar, IBM Corp., 1133 Westchester Ave., White Plains, N.Y. 10604.

July 28-29, San Jose, Calif. — **Association for Computing Machinery Pacific 77 Regional Conference.** Contact: Peter Szego, Ampex Corp., Mail Stop 3-22, 401 Broadway, Redwood City, Calif. 94063.

Call for Papers

1978 IEEE INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING, Tulsa, Okla., April 10-12, 1978.

Authors should submit titles and abstracts in the areas of general signal processing, speech processing, underwater acoustics, seismic signal analysis, electroacoustics and noise measurement.

One hundred word abstracts should be sent by Sept. 22 to Thomas H. Crystal, Institute for Defense Analyses, Thanet Road, Princeton, N.J. 08540.

LAWRENCE SYMPOSIUM ON SYSTEMS AND DECISION SCIENCES, Berkeley, Calif., Oct. 3-4.

Papers invited in all areas of systems and decision sciences and their applications to planning, control, modeling, forecasting, identification and other aspects of decision making. Of special interest this year are papers relating to energy systems, although applications are sought from all types of engineering and socioeconomic systems.

Authors should send three copies of a detailed abstract by June 15 to D.D. Siljak, School of Engineering, University of Santa Clara, Santa Clara, Calif. 95053.

EUROCOMP 78, THE EUROPEAN COMPUTING CONGRESS 1978, London, May 9-12, 1978.

Topics include, but are not limited to: the impact of on-line information systems, applications and case histories, information systems design, multimini systems, distributed and disbursed systems, time-sharing systems, data bases in an on-line environment, systems economics and feasibility, cost benefit analyses, operations management of the information system, fail-safety and security measures, fallback procedures for systems failure, national and international data protection legislation, achieving privacy and data integrity, the cost of privacy and transfrontier data regulation.

Also, computer network design, pubic data networks, PTT plans and developments, value-added services, private data networks, network control and monitoring, network interconnection, regulatory and tariff issues, host and terminal interfacing and terminal handling protocols.

One thousand word summaries should be sent by July 29, 1977 to Eurocomp 78, Online, Cleveland Road, Uxbridge UB8 2DD England

Seven tough problems in "On and how Tandem's "NonStop"™

The Tough Ones.

1. System Down—Processor Failure.
2. System Down—Disc Failure.
3. System Down—Repairing Hardware.
4. System Down—Restoring Data Base.
5. System Down—Software Failure.
6. System Down—Changing to a Larger Processor.

Lots of things change when you go "on-line." Mostly for the better. That's why this is the most important trend in data processing today. But the one area which concerns management the most is "What happens when the computer goes down?" It's a good question, and until Tandem introduced "NonStop" processing last year the answers weren't pleasant. Service is interrupted; that's bad enough. But there is worse news still. At the instant of failure, a transaction in process could be lost (or duplicated), a record being updated could be destroyed, or a pointer changed incorrectly could cause the loss of untold records. In short, loss of service is the surface cost. Loss of data base integrity is an even greater problem. Tandem's NonStop System, hardware and software, is the first top-down, designed-in solution to both these problems. To make it even better, we've designed it so it's easy to program, easy to expand, and easily the most efficient transaction processing system around.

1. System Down—Processor Failure.
Every computer will fail sometime. The bigger they are, the more often they fail. Tandem has replaced bigness with a unique multiple processor architecture. Workloads are shared by the processors under control of Guardian, the only NonStop Multiple Processor Operating System available regardless of price class. When a component fails, Guardian automatically reassigns both processor and I/O resources to ensure that in-process tasks including file updates are completed correctly. You decide the priorities; Guardian does the work. And no interruption of your "on-line" workload occurs. Restart is virtually instantaneous.

2. System Down—Disc Failure.
When one of your disc storage devices fails in the middle of a file update, unknown damage to the record, to record pointers, or to indices can occur. Enscribe, Tandem's NonStop Data Base Record Manager, ensures that the damaged record is restored; and, with our optional Mirror Volume duplicate file technique, that operation is continued using the back-up file. The back-up files are created automatically and are used by Enscribe to improve system response time. When the down disc is repaired so are its files, automatically, by Enscribe. You decide which volumes to back up; Enscribe maintains them, and no interruption of service occurs.

3. System Down—Repairing Hardware.
With any system, a hardware failure must be repaired. But only with Tandem can the system keep operating, right through the failure and through the repair, too. Tandem's Customer Service Representative can remove and replace any failed module in your system without interrupting service. The operators at terminals and the programs in process are totally unaware of either the failure or the repair. And routine maintenance, too, is performed with the system fully operational. This is one more unusual feature of our system, but without it, no system can truly be called "NonStop."

4. System Down—Restoring Data Base.
When a hardware failure occurs during file update in any "on-line" system which is not NonStop, there is every reason to question the integrity of the data base. Integrity of the data base is crucial. For this reason, elaborate procedures to maintain restart points and backup files are required in almost all "on-line" systems. Not with Tandem. Using Guardian and Enscribe, the Tandem NonStop System ensures that all transactions are completed correctly even if a processor, I/O channel, disc controller or disc drive fails during that transaction. Equally important, the system downtime normally required for "restore" and "restart" operations is eliminated.

5. System Down—Software Failure.
System software crashes are an important source of downtime in ordinary on-line systems, but not in Tandem installations. Because all Tandem software is designed and tested to run in a multiple processor environment, it is also designed and tested for failure modes never considered in single processor systems software. Most important, the use of independent processors, each with its own memory, assures that a software failure in one processor cannot cause a failure in a second processor or contaminate the data or programs executing in that processor.

6. System Down—Changing to a Larger Processor.
On-line systems tend to grow, and as they grow they change. New applications, more stations, improved service; all of these result in a need for bigger, faster processors. With Tandem's NonStop System you can actually add processors, add memory, and add peripherals without any re-programming whatsoever. Using Guardian, Enscribe, and Envoy, Tandem's Data Communications method, all user programs and all files are geographically independent. They have to be for NonStop operation. You can also write your programs using a powerful high-level compiler for a multiple processor environment as easily as for a single processor.

7. System Up—Confidence Down.
When an "on-line" system is up, people come to rely on it. And because today's computers are reliable, people have come to rely on them quite heavily. Which makes it even worse when the system does go down, or the information it supplies is wrong. Confidence is severely damaged. And anyone who has tried manual back-up systems knows that they are not the answer. An automatic back-up, non-stop system is the answer. And Tandem has it.

DP Picture Relatively Stable

Employment Outlook 'Guardedly Optimistic': Survey

NEW YORK — A "guardedly optimistic" picture of employment for the remainder of 1977 has emerged from a recent survey that showed 54% of the nation's businesses expected overall employment in their organizations to increase.

The survey, conducted by Deutsch, Shea and Evans (DS&E), a human resources consulting firm here, also found that 28% of the industrial, business and service organization respondents saw employment as "stable" in their organizations. Only 12% expected it to drop.

In the area of DP, however, only 32% of respondents surveyed indicated the number of employees would grow, but 39% — higher than the overall average of 28% — saw employment as remaining "stable."

Survey data suggested a continuing emphasis on the hiring of women and members of minority groups (54%) and the recruitment of engineers (41%).

Reasons for Changes

Where executives expected stable employment levels for the remainder of the year, the reasons given ranged from having already met their hiring goals for the year to expectations that their businesses would remain stable.

An expanding economy and an increased demand for products and services were the reasons most often given for forecasting employment increases. Of the 54% who indicated increases, most cited a "general increase in business activity" or mentioned expansion programs and increased sales.

The 12% who foresaw a decrease in total employment in their organizations attributed it principally to poor economic conditions in their sectors of the economy and a "necessity for increased productivity." One mentioned "slower sales growth due to shortage of capital investments." Another cited "a decrease in business."

Businesses Represented

The survey represented businesses with employees ranging from fewer than 1,000 right up to those with 5,000 or more, from all sectors of the U.S.

More than one-third of the firms surveyed planned to hire additional production workers and new college graduates will be hired by about 38%.

This employment level forecast survey is one of a semiannual series which DS&E has been conducting since 1974. The findings confirm an earlier survey conducted by DS&E in October 1976 which predicted an increase in hiring for this year.

Speech Synthesis Patent Awarded

WASHINGTON, D.C.— A patent was awarded here recently for a computer that synthesizes speech.

The patent for an "adaptive linear prediction speech synthesizer" was granted to Bell Telephone Laboratories staff researchers Joseph Kohut and Joseph P. Olive. The machine is said to speak as fast as or faster than a human being. It will enable computers to speak to people — over the phone, for example — instead of a telephone operator.

Although the equipment has been used in the speech research division, it has not yet been used in actual telephone network business.

Olive has worked for Bell for eight years, and Kohut, an electronics technician, for 25 years.

Line" Data Base Systems System solves them.

Tandem offers a proven, field tested solution to the two principal questions everyone should ask about an "on-line" data base system: What level of service will it provide? What protection does it offer for my data base?

Someday all "on-line" systems will be NonStop. Tandem 16 Systems are NonStop today. And without price penalties. Not everyone needs an on-line, real-time, non-stop system, but for those who do there isn't another solution worth thinking about. Tandem Computers, Inc., 20605 Valley Green Drive, Cupertino, California 95014 or Tandem Computers GmBH, Bernerstrasse 50A, Frankfurt 56, West Germany.

Toll Free 800-538-9360 or 408-255-4800 in California.

Guardian

Multiple Processor Operating System

NonStop operation.

Automatic re-entrant, recursive and shareable code.

Virtual memory system.

Geographic independence of programs and peripherals.

Enscribe

Data Base Record Manager

Provides relative, entry-sequenced and key-sequenced files.

Each file may be up to four BILLION bytes.

Up to 255 alternate keys per file.

Optional mirror copy by disc volume.

Envoy

Data Communications Manager

Communications with remote devices and/or processors.

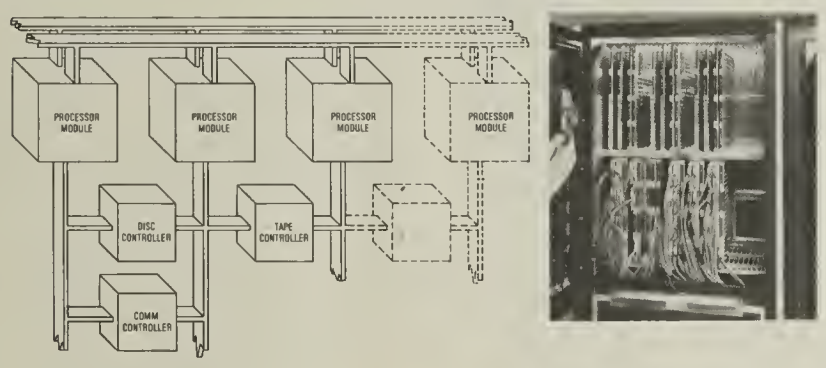
Support of point-to-point, multi-drop, master and/or tributary.

All transfers via DMA.

Speeds up to 19.2Kb asynchronous and 56Kb synchronous.

See us at NCC

Photo and schematic show three processor modules with space for fourth module, interconnected to disc controllers, tape controllers and communications controllers.



TANDEM

The Tandem 16 NonStop System is composed of multiple, independent processors with dual redundant communications paths. The unique interaction between Tandem hardware and software assures not only continuous operation, and the integrity of your data base, but also throughput unmatched by any other computing system of comparable cost.

YOU'RE INVITED . . .

TO A FREE HALF-DAY PRESENTATION OF

SPSS*

FROM SPSS inc.

- **THE STANDARD IN STATISTICAL SOFTWARE** installed at 1500 sites in all 50 states and over 60 foreign countries on 25 different manufacturers' hardware
- **WELL-DOCUMENTED** over 150,000 copies of the SPSS reference and the SPSS PRIMER have been sold by McGraw-Hill*
- **EASY TO USE AND INSTALL** consistent high ratings in the DATAPRO user surveys On-site training is available, but is rarely needed — which helps reduce the cost of the package
- **COMPREHENSIVE STATISTICS AND DATA HANDLING** twenty different statistical procedures plus data and file modification capabilities
- **WIDE RANGE OF APPLICATIONS** besides major colleges and universities SPSS users include banks, oil companies, public utilities, auto and drug manufacturers, and various consulting firms

June 16 — DALLAS	July 25 — WASHINGTON
June 27 — BOSTON	August 29 — ZURICH
July 11 — NEW YORK	September 12 — LONDON

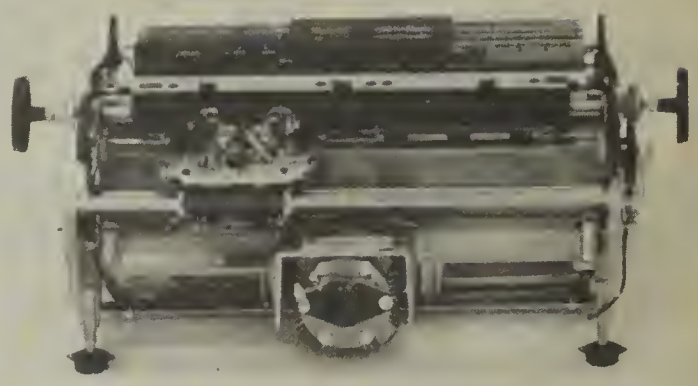
TO REDISTER — indicate your city choice on a business card or letterhead and send to

Wylie Crawford
Director of Customer Services
SPSS, Inc
Suite 1234
111 East Wacker Drive
Chicago, Illinois 60601
or call
312/861-0933

DATA SOFTWARE HONOR ROLL

*SPSS is a trademark of SPSS, Inc

Going to the NCC? See SPSS on the PRIME computer Booth 1383



New 1200 Baud Matrix Terminal First Shown at NCC '77!

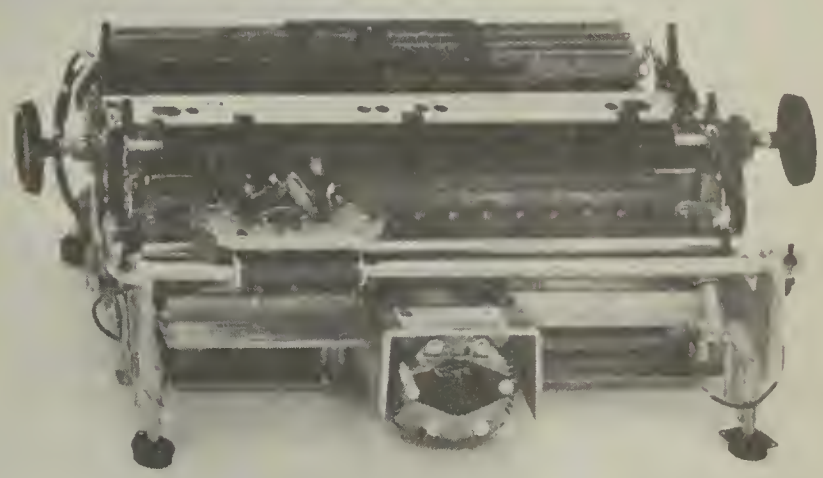
See the Diablo NCC line disk drives, terminals,

Everything You Need To Give Your Systems Customer Sales Appeal!

See our new Matrix Terminal! 1200 Baud. Transmits 4 to 5 times the data at no extra cost! 100% duty cycle! Updated, ultra-sophisticated Matrix head! Upper and lower case printing!

A tough, rugged workhorse designed to assure you greater throughput!

See our disk drive family! Our proven Series 30, redesigned Model 44B and our Series 400 family of dual head positioner disk drives. Static and dynamic displays to prove Diablo really covers your memory product needs!



-up of printers, technology & service!

See Diablo printer power! Daisy wheel or Matrix, only Diablo delivers both! See our proven HyType II line of 45 and 55 cps mechanisms! See our proven letter-quality Word Processing model! The broadest range of daisywheel support products offered! More wheels, fonts, languages, features and forms handling accessories than you'll find anywhere!

Come see us!
NCC Houston space #1479.

Diablo

Diablo Systems Incorporated
24500 Industrial Blvd., Hayward, Calif.

Diablo is a trademark of XEROX® CORPORATION.

Changes in Size, Cost Bring Minis Into 'Adolescence'

By Ann Dooley
Of the CW Staff

MINNEAPOLIS — The minicomputer industry is just "entering its early adolescence the stage the rest of the industry went through in the '60s," Steve Dukker, keynote speaker at the *Computerworld* Computer Caravan, said here recently.

"In the last five years, there's been such a revolution in technology, size, cost and memory," that the mini has broken out of the scientific, education and control industries and integrated itself into the commercial marketplace, Dukker, president of Dedicated Systems, Inc., said.

During the infancy of minicomputers, the OEM systems manufacturers looked at the industry and went right into it, he said. But it was a vertical marketplace; the minis were built for certain applications and so were confined to very specific functions. They were modified from the scientific application minicomputers and had no standardization whatsoever, he said.

"But as the minis began popping up in more and more places, software companies stepped in to increase their capabilities and allow them a combination of simple performance tasks," he said.

"The minicomputer manufacturers weren't in the forefront of the changes because they were too busy pumping iron, just pushing out the machines," Dukker said.

It was Basic Four Corp. that started the idea of selling a general mini to businesses and met with "phenomenal success," he said.

It was then that manufacturers began to take a second look at what they were making and decided to reconfigure the basic selling point.

Few Similarities

There are still not many similarities between systems and the trend toward standardization has just begun, he said. Actually, a cross-fertilization has occurred: The large user has learned something from the small user which is that minis can be used for certain applications in their operations for less cost than doing it all out of one large CPU, Dukker said.

The use of minicomputers in this manner has led to decentralization and a different construction of the DP utility, he noted. But the shared cost benefit has made all the changes and tumult worthwhile, he commented.

"The power that used to be associated with a strong centralized center is now becoming available to anyone," he added.

"As I see it, the next stumbling block is the human factor," Dukker stated. Mini manufacturers must change their image of "dropping the system off at the door of the user." They must work with the user and the system until each is confident and happy with the results, he added.

The industry is at the "standpoint of growing young once again," Dukker noted. "We must step back to decide how we want to develop to maturity. It's exciting to think that we really don't know where we'll be in the next five years," he said.

IEEE Publishes Book Discussing Microprocessors

NEW YORK — *Microprocessors: Fundamentals and Applications*, a book of selected reprints, has been published by the IEEE Press. The collection was edited by Wen C. Lin of Case Western Reserve University.

The purpose of this book is to aid those who are weak in computer fundamentals to gain an understanding of how microprocessors work and how they are being applied in system design and instrumentation.

The 43 reprinted papers are arranged by subject category into four parts. The first part contains introductory papers giving general information on microprocessors. In the second part, the reprints cover architecture, software, interface, system development aids and testing. The papers in the third part describe some of the myriad applications of microprocessors, while those in the fourth part are concerned with assorted topics, including the use of microprogramming techniques as a bridge between hardware and software engineering.

The 344-page volume, sponsored by the IEEE Computer Society, is priced at $9.95 for the paperbound member edition. A clothbound edition is available for $19.95 (discounted to $14.95 for IEEE members).

This book can be ordered postpaid from the IEEE Service Center, 445 Hoes Lane, Piscataway, N.J. 08854. Payment should accompany the order.

LARGE CONVERSIONS
KEY PUNCH
KEY-TO-DISC
Fast Accurate Service.
Largest in New England.
ADVANCED AUTOMATION Assoc.
Boston • Braintree • Tewksbury
(617) 729-4060

Introducing the Smarts terminal control unit.

CDP Takers Up

CHICAGO — The number of DPers who have signed up to take the Institute for Certification of Computer Professionals (ICCP) exam for DP certification reached an all-time high this year, according to ICCP President G. Gary Casper.

ICCP statistics indicate that 3,164 persons registered for the February 1977 exam, 27% ahead of last year. Further, 1,505 passed the exam, or 47%, compared with last year's 37%.

Scrounging Produces Ultralow-Budget Shop

By Robert L. Glass
Special to Computerworld

BELLINGHAM, Wash. — If scrounging is the most cost-effective way to build a computing installation, then Dr. Melvin Davidson of Western Washington State College (WWSC) probably deserves a Computer Manager of the Year award.

WWSC's installation is a hodgepodge of finely tuned miscellaneous equipment ranging from Interdata minis which behave like maxis to a 360 maxi which by contrast performs like a mini. And for roughly $100 a month per port, WWSC supports a "terminals-for-all-students" philosophy that nearby Simon Frazer University rejected for some applications because its traditional approach cost nearly 15 times that much.

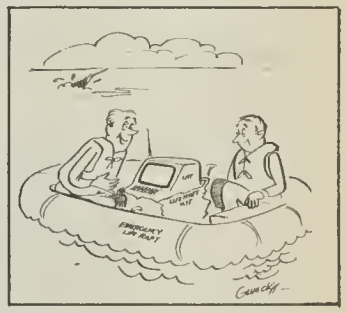
Davidson's secret of success is watching WWSC's (and the taxpayers') dollars. His three Interdata 70s came used for $7,000. The innards of those machines, and of his more conventionally purchased Interdata 7/32s, are liberally sprinkled with replacement components from other manufacturers. His staff does its own maintenance.

Davidson watches the ads in the journals for bargains and is willing to risk innovative approaches. The installation, which consists of a 360/40, a now ancient IBM 7090, three Interdata 7/32s and the three Interdata 70s, is configured in these unusual ways:

- The 360 "front ends" for the 7090 and "back ends" for the Interdata units.
- The 7090 is maintained (for $700 last year) by cannibalizing parts from a backup 7094.
- The Interdata 7/32s have three times the memory of the 360 and run five times as fast. They support general campus time-sharing.
- The time-sharing installation functions 24 hours a day without operator support. (Tapes are not used and disks are on-line.)
- Tape cassettes compatible with terminals are loaned to students for maintaining their own data bases. (This has not been entirely successful, since cassette tape formats are not standardized, Davidson said.

The result of this low-budget approach is that terminal time is sold at 30 cents per connect hour, less than any other method available to WWSC. The system supports heavy computer-aided instruction (CAI) usage as well as more traditional applications, and during the night hours it becomes the college's business DP center. Twenty four hard-wired terminals are hung on each of the three minis.

Davidson, who has successfully brought WWSC through the minicomputer revolution, is now scratching his head over the impact of the micro on the low-budget manager. From his hardware-oriented vantage point, he sees the computer center of the future as a staff of systems maintainers who make the rounds of decentralized computer centers, keeping them running in optimum fashion. For example, WWSC is gradually isolating each hardware system to the discipline or disciplines which need it.



'They're Turning Up Everywhere'

It makes a terminal system work.

We designed our Smarts™ terminal controller with multiple microprocessors and floppy disk storage to perform concurrent operations and provide flexible editing capability.

All at a surprisingly low price.

With our Smarts controller, you can mix and match any terminals in our product line to tailor a system that meets your requirements.

Operating at speeds up to 1200 baud, a Smarts-controlled system is ideal for handling your data and message communication needs.

With a Smarts controller, operators can keyboard information, edit data, pre-store formats for operator prompting and can print out data in hard copy form. In addition, your computer can poll your Smarts-controlled system at any desired frequency.

Concurrent operations.

As the chart shows, our Smarts controller can perform several operations concurrently.

For example, it can print data to a local printer, while data is either being transmitted to, or from, your computer—all while your operator is inputting data.

This concurrent capability enables your operators to work without interruption, making maximum use of their time and the Smarts-controlled system.

Editing capability.

The Smarts controller also features a powerful 26-command text editor, providing word processing functions. Entire data strings can be substituted with unlimited character insert/delete capability.

A single disk storage unit has the capacity to store over 270,000 characters in up to 60 files which operators can access by name. Operators can segregate and link files for sending or receiving, and they can selectively print one or more of them. Disk files are dynamically allocated so your operator never has to specify file length in advance.

Concurrent operations:

1. Keyboard → Smarts.

2. Smarts → Printer.

3. Smarts ⇄ Computer.

Multi-micro based Smarts-controlled terminal system can perform three levels of concurrent operation.

Termicare too.

Like all terminals in our product line, our Smarts-controlled system is backed by our nationwide Termicare® service.

For more information, call Bob Roth toll-free 800-631-7050, (In New Jersey, 201-529-1170.)

Or write: Western Union Data Services, 70 McKee Drive, Mahwah, N.J. 07430.

Visit us at Booth 2008 at the NCC Convention.

western union data services

© WESTERN UNION DATA SERVICES COMPANY 1977

INTRODUCING . . . .

SCSS*

SPSS* Conversational Statistical System

From SPSS inc.

- **FULLY CONVERSATIONAL** runs on 360/370 TSO (and soon, CMS) installations. COC CYBER and DECsystem 10 and 20 versions are underway
- **SELF-INSTRUCTIONAL** three prompting modes for new users. Or, you can direct the system without waiting for prompts
- **EFFICIENT AND INEXPENSIVE** a transposed file structure minimizes memory size, I/O operations and general CPU usage
- **FROM THE AUTHORS OF SPSS** the standard in statistical software — see ad on previous page
- **FILE COMMUNICATION WITH SPSS** system data files created by SPSS can be analyzed by SCSS, and vice versa

The following free presentations have been scheduled for the mornings of

June 28 — BOSTON
July 12 — NEW YORK
July 26 — WASHINGTON
August 30 — ZURICH
September 6 — UTRECHT
September 13 — LONDON

TO REGISTER — Indicate your city choice on a business card or letterhead and send to

Wylie Crawford
Director of Customer Services
SPSS, Inc.
Suite 1234
111 East Wacker Drive
Chicago, Illinois 60601

or call us at 312/861-0933

*SCSS and SPSS are trademarks of SPSS, Inc.

CW Photo by A. Dooley
Anna Tipton

Technical Skills Often Secondary

Worker Rapport Seen Vital to Success

By Ann Dooley
Of the CW Staff

NEW YORK — The ability to get along with others in a working environment is the most important requirement for employment. The second is the ability to communicate, according to Anna Tipton, vice-president of Advanced Computer Techniques (ACT), a consulting firm.

These qualities are often more important to the success of a project than the amount of technical expertise the group has, Tipton told a Computer Caravan audience recently.

Hiring practices are of prime importance for the success of the working situation and the projects, she added, and the most important part of the hiring process is defining the personnel requirements for the particular job. These should be worked out before starting recruitment, she said. "You must determine whether you want a superstar or a good steady programmer who will stay for several years," she noted.

After defining the job position, certain technical and personal aspects of the applicant should be considered before hiring, Tipton said.

Personal characteristics that are important to examine are maturity level, appearance, communication abilities, reaction to stress, initiative and ambition, she said. The importance of each of these varies according to the specific need and kind of job.

A review of technical experience should include asking what kind of background the applicant has within a particular application, she said. In addition, a DP manager should find out what kind of related equipment and operations experience the candidate has had. Further, his prior training, exposure and general business experience should be considered, she advised.

Tipton also warned employers not to rely too much on resumes as these can often be misleading as to the actual amount of experience an applicant has had.

Tipton often questions an applicant to discover if he holds a general understanding of the implications and results his work has had on the companies he has worked for in the past. "It's hard to operate in a vacuum and if the employee knows all the implications of his project," he is probably fairly sharp, she said.

Salaries can often be a delicate problem in hiring, she said, because new employees with specialized knowledge could be asking for far more money than the present staff members are earning who have been on the job for years, she said.

"There are not that many people on the market who are good, so those who are good command high salaries," she said. The reason for the numbers of low-level people is the market slump in the 60s, she said. This abundance of less experienced workers has also led to a greater emphasis on outside courses and on-the-job training, she added.

During Tipton's workshop, one attendee asked why someone leaves a job. Answers ranged from the fact that the "grass is always greener . . . " to the fact that employers often "oversell" a job to an applicant, a situation that results in a dissatisifed employee. The employer should specify exactly what the job is and specify where it could lead.

Another aspect of job dissatisfaction is lack of recognition, attendees agreed. The salary review is too often tied to performance review; instead, there should be more consistent meetings with the staff to pat them on the back or kick them in the pants, without making it a traumatic event, one attendee noted.

Qualities that make a good manager are communication and constant interaction on the right level with the staff, the group agreed.

One member of the audience said in his company, manuals are kept from the programmers. Most disagreed with this philosophy because it inhibits employees from adding to their knowledge. As long as they are learning they're happy, but when they stop, they become bored and dissatisfied.

In the end, hiring has to be purely subjective, she said. "I've never seen a test that could pick out who would be good." The applicant should be judged on his own merits, she added.

In addition, a company shouldn't limit hiring to math or computer science majors or even to people wth college degrees, she said.

Tipton also pointed out that in the early 70s people were looking for security because of the 60s slump, but now there is more of a demand for interesting work. Salaries aren't the major issue because good people can get pretty much what they want, she said.

Equifax Must Let Public See Its Consumer Data Files

BOSTON — Under an agreement with Massachusetts Attorney General Francis X. Bellotti, Equifax, Inc. must allow individuals here to see whatever information is in its files relating to the consumer, except medical information, in addition to the information found in its standard consumer report.

Equifax is one of the nation's largest consumer reporting companies.

The agreement applies to all information whether or not it is covered by the state's Fair Credit Reporting Act, which is the same as the federal fair credit law.

We've brought planning, control and accounting together. And made them talk to one another.

For years, FORESIGHT™ has been the premier planning and corporate modeling system, with more than 100 installations in Fortune-500 companies, government agencies and overseas firms. Now Foresight Systems Inc. offers the same level of flexibility, quality and documentation in a complete range of financial systems for planning, accounting, control. Functions so closely related in corporate management now can be just as closely related in the computer.

And information generated in accounting is available for planning. Dependably. Without manual re-entry. And with a complete audit trail.

Investigate FORESIGHT for planning and control, the INFONATIONAL set of integrated accounting packages, and FORETAX,™ the comprehensive corporate tax system. They talk to one another.

Write or call for more information:

Marc Margulis
1901 Avenue of the Stars
Los Angeles, California 90067
213/277-2722

Kim Lombard
Post Office Box 82477
San Diego, California 92138
714/560-7070

Dan Jones
150 North Wacker Drive
Chicago, Illinois 60606
312/782-2375

Barry Meyers
Two Penn Plaza
New York, New York 10001
212/736-4225

Ron McClarty
4544 Post Oak Place
Houston, Texas 77027
713/622-4490

FSI FORESIGHT SYSTEMS INC.
First choice in finance.
A subsidiary of United Computing Systems, Inc.

IBM USERS:

PUT YOUR 3270s IN LOCAL MODE UNDER SDLC AT UP TO 56KB WITHOUT VTAM OR NCP.

PIX-II is the industry's first virtual data link. That means it performs all of the functions of an SDLC network, but with none of the actual hardware or software required by IBM.

By removing all of the complexities between the byte multiplexer channel of your host CPU and the remote devices it communicates with, PIX-II makes those devices appear to the CPU to be in local mode.

Stop for a minute and think about what that means to your current and future plans for using 3270-type data entry devices. It means seven benefits that would otherwise be unobtainable anywhere.

First, it means you can build a 3270 network virtually overnight, regardless of your current processor model or software system, and without any front-end hardware or software. A PIX-II local controller installs on you CPU's byte multiplexer channel, taking the place of a 3272 local controller. A PIX-II remote controller installs at each remote site, with a 3272 local controller. The 3271 remote controller is eliminated. The installation takes a day, requires no software modification, and gives you—immediately— a completely operational 3270 network.

Second, that installation now puts all of your 3277-type terminals in local mode, as if they were right at your host CPU site, attached to a byte MUX channel.

Third, now that your CRT stations are in local mode, polling is totally eliminated. Every 3277 is served on a demand basis, as if it were the only terminal on the network. Nor is there any need for polling software overhead. You don't need it.

Fourth, the result of this systems configuration is improved response time for every 3277, regardless of its location. On average, that improvement will be about four times better than what you now achieve: from an average of eight seconds, to just under two seconds. For *every* 3277, consistently.

Fifth, no remote terminal access software is needed. None. No remote BTAM or remote TCAM if you operate under non-virtual methods. No VTAM and related NCP front-end software (there is no front-end) if you operate under virtual technology. That feature alone saves you months of effort.

Sixth, whether you operate under bisynch or SDLC now, PIX-II immediately gives you all of the benefits and speed potentials of SDLC, with no development work required. None. The PIX-II data link operates at speeds up to 56KB, so all you have to do is specify the type and speed of communications link—from a 1200 baud leased line to a 56KB satellite link. PIX-II takes it from there.

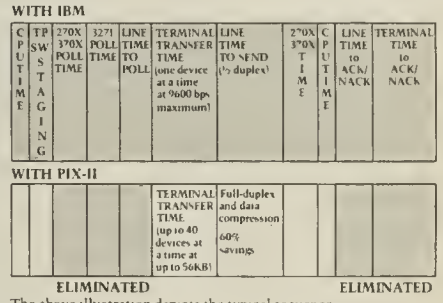
Seventh, putting up an instant 3270 network is just the beginnings of what you can do with PIX-II. Once it's installed, you can attach remote peripherals, HASP or JES work stations, console controllers, and even use it to develop a true CPU-to-CPU link without ACF.

You'll also like the price. PIX-II costs less than the equipment it replaces—far less in some cases. Its greatest virtue, however, is that it lets you do right now what you'd like to do right now—with virtually no effort required.

Find out more about PIX-II. Send us the coupon or call our nearest sales office. PIX-II: the beginning of tomorrow's 3270 networks.

PIX-II LETS YOU DO IT RIGHT NOW.

The Secret of PIX-II's Data Link Efficiency



The above illustration depicts the typical sequence involved in executing a single 3270 transaction under IBM protocol—and the many little ways in which PIX-II eliminates or reduces many of those sequences. Can you afford not to find out more about PIX-II?

Tell me more about PIX-II. My immediate 3270 requirements include:

- ☐ Expanding an existing 3277 network quickly.
- ☐ Establishing my first 3270-type network.
- ☐ Adding remote peripherals as well as 3277s.
- ☐ Avoiding costly software and systems development.
- ☐ Other: _____

Name: _____

Title: _____

Company: _____

Street: _____

City: _____ State: _____ Zip: _____

Telephone: _____

paradyne

Paradyne Corporation, 8550 Ulmerton Road, Largo, Fla. 33541 (813) 536-4771

See us at NCC

From 'Famine to Feast'

Wide Range of Choices Available in A/V Materials

The 10th annual *Guide to Audio/Visual Instruction on Data Processing*, released last week by the University of Colorado, demonstrates that in just five years we've gone from "famine to feast." Five years ago there were significant gaps in the array of multimedia materials for self-study. Today the training director not only has instructional materials available for all basic areas, but has a choice of courses from several vendors.

For example, the data base instructor has a tremendous advantage this year over last. Dr. Fred McFadden, who teaches our data base course, has a three-prong approach: basic instruction through textbook and lecture, reinforcement through self-study with Deltak's IMS course and hands-on experience with a live data base management system (DBMS).

Advanced Systems, Inc. (ASI), Deltak and Edutronics — the big three vendors in audiovisual (A/V) courses — continue to widen the gap between themselves and their competitors. The computer vendors are not producing A/V courses at anywhere near the volume of any of these companies, although Honeywell has released several new courses.

Dave Cook, manager of Honeywell Education Services, said the company's "predominantly Series 200/2000 oriented curriculum of multimedia offerings evolved into a far more generic array of programs, such as: Fundamentals of EDP, Concepts of Disk Processing, ANS Cobol Concepts, ANS Cobol Programming and RPG II Programming."

Serge Beauregard, vice-president of product development for Deltak, reported many new courses. Among those are: Data Base Overview (two modules), CICS/VS Facilities (four modules), IMS Design Techniques (six modules), CICS Concepts and Facilities (five modules) and Using MVS Catalogs (two modules).

J. Daniel Couger On Education

Al Allen, vice-president of marketing, provided a list of new ASI courses produced during the first half of 1977. Among those courses are: Total (three modules), Mark IV (two modules), ANS Cobol (six modules), CICS/DLI (two modules), Networking a DP Communication System (one module), Structured Design (two modules), Computer Security (three modules updated), DOS/VS Operator Training (five modules).

Pat Sorrentino, vice-president for research and development, described Edutronics new courses: CICS/VS (seven modules), BAL Efficiencies (five modules), Assembler Language, Entry Level (four modules), Sort Merge (one module) and Report Writer (one module).

"Making It Count"is a college-level introductory course about computers and computer applications. The course consists of twenty 30-minute video sessions, instructor and student materials. It was developed by Boeing Computer Services.

We are using Digital Equipment Corp.'s new 17-part multimedia course on minicomputers with good results. Entitled "Introduction to Minicomputers," the course is an audio/filmstrip series designed to present computer fundamentals for students, technical personnel without computer knowledge and general corporate management.

Each year the National Compute Conference includes a Computer Science Film Theater. Adrian Basili of AT&T was the coordinator for that area of the 1976 NCC; his list of films and sources is included in the A/V guide.

Lansford Publishing Co. produces a wide variety of transparencies for use in DP courses: the systems approach (15 transparencies), Introduction to cybernetic systems (15 transparencies), simulation (12 transparencies), introduction to DP (36 transparencies), computer hardware (81 transparencies), Fortran (20 transparencies), information systems (20 transparencies), data processing system design (16 transparencies).

The 10th *Annual Guide to A/V Instruction in Data Processing* lists the products of each of the suppliers of A/V materials. For a copy, send $4 ($5 if you require an invoice) to *Computing Newsletter*, Box 7345, Colorado Springs, Colo. 80933.

Couger is professor of computer and mangagement science at the University of Colorado.

Take an in-depth look at in-house timesharing:

You know the problems facing the data processing department:

Other departments in your company want faster response, broader capabilities, better service.

And your management wants you to hold down your operating costs.

You're probably looking hard for a solution. A closer look at in-house timesharing could give it to you.

Fast, long-lasting relief
Unlike upgrading a large central computer, expansion to an in-house timesharing system isn't a time-and-money-consuming ordeal.

And unlike buying outside computer time, you're not building in a monthly bill that inevitably keeps building up.

Adding an in-house timesharing capability is a shrewd way to add computer power. Because it won't add significantly to your operating costs; in fact, it can pay for itself by reducing current costs.

Especially if you add the system specifically built for timesharing: our BTI 4000.

A timesharer's timesharer
The BTI 4000 Interactive Timesharing System is made by us:

Basic Timesharing, Inc. We're the computer manufacturer with timeshare experience. Which has helped us produce a computer uniquely right for timesharing.

To help you do more—while helping your company spend less.

Easy to begin, room to grow
You can own your own BTI 4000 for as little as $35,950. For that you get a ready-to-go system with 10 megabytes of storage and 8 ports—just add terminals.

And start-up won't cause a departmental hang-up. The BTI 4000 can be installed and working for you in one working day.

Expanding to do even more work takes even less work. The BTI 4000 features modular construction, so system downtime for expansion is minutes, rather than days. You can add disk storage to 400 megabytes; increase user capacity to 32 ports; add peripherals like industry-compatible magnetic tape and a line printer.

Hard working, always working
The BTI 4000 is a true timesharing system. It allows doing any mix of tasks, all at the same time, all completely independent.

It also gives you continuous system availability, because software housekeeping can be performed while users are on-line.

There's also off-hours jobstream processing. So the BTI 4000 can be working for you, even when no one's around.

The BTI 4000 uses BASIC-X, an unusually powerful extension of the BASIC user language, enhanced for business programming.

What's more, the BTI 4000 offers heirarchal account organization and stringent security so that you can maintain total control over who's using it, and what they can do.

And it does all this without a full-time operator.

Inexpensive help
Used during typical office hours, the operating costs for a BTI 4000, including maintenance, are about $1 per terminal hour. And should you grow to 24 hour usage, your operating costs shrink to less than 10¢ per terminal hour.

Around-the-clock help
We back our BTI 4000 with any-hour, anywhere, on-line support with dial-up access for problem diagnosis. Yet in a typical installation, our maintenance plan costs less than 1% of the system's purchase price per month.

Look to us
The BTI 4000. The interactive timesharing system that will help your data processing department do more, for less.

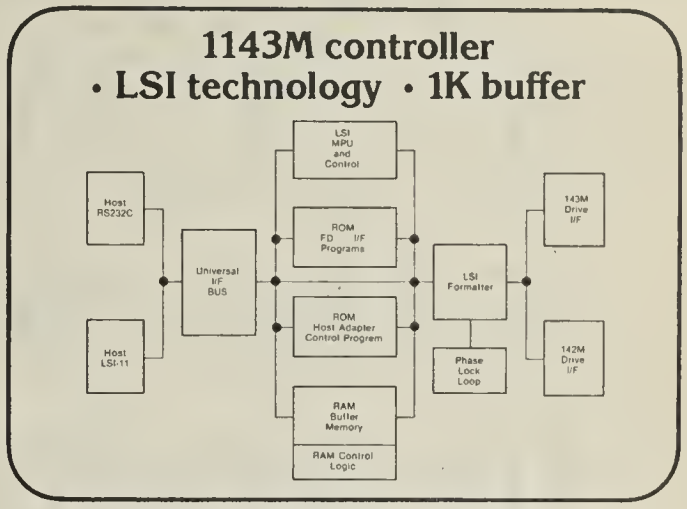
For more information, just look to the Basic Timesharing office nearest you.

The BTI 4000 Means Business.

Basic Timesharing Inc., Headquarters: 870 W. Maude Avenue, Sunnyvale, CA 94086. Sales Offices: East: Cherry Hill, NJ (609) 662-1122; Midwest: Minneapolis, MN (612) 854-1122, Chicago, IL (312) 298-1177; West: Sunnyvale, CA (408) 733-1122, Anaheim, CA (714) 533-7161

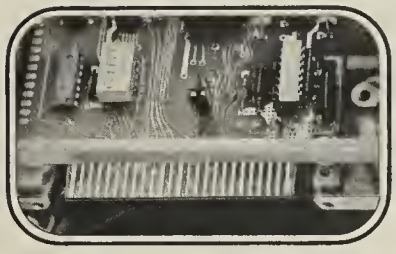
Meet the First Family in floppies.

The roots of our floppy family

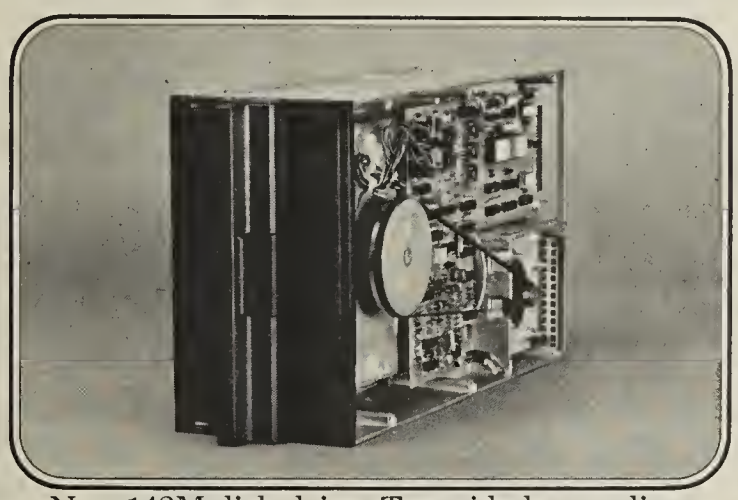


More control with our family

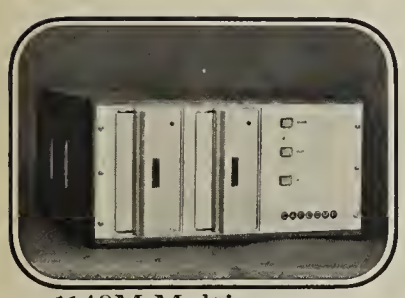
Dual head



50 pin LSI interface



New 143M disk drive. Two-sided recording. Single/double density. LSI Multifunction.



1149M Multipurpose Cabinet assembly. Rack or table mounted.

LSI-11
RS-232-C
S-100 BUS

Our host adaptors

CalComp's got it all together for you. A total floppy family. Any way you want it...single products or the total package. In every case you get *true* multifunction; LSI technology, high MTBF and low MTTR reliability, compatibility and multiple interfaces.

And that's not all. *Field-proven* double density —now one or two-sided. And our new 1143M controller along with three host adaptors.

With CalComp it's all there. Choice. Flexibility. Everything you need for all or part of a total memory subsystem. *Plus* CalComp's worldwide service to support our family. We've delivered 50,000 drives—why not add your application requirements to our growing family.

Just call us or use the coupon. We'd like to tell you more about our family.

CW M6-77

California Computer Products, Inc.
2411 West La Palma Avenue
Anaheim, California 92801
(714) 821-2011

FREE

Please send me your free Floppy Family information kit.

_____I am interested _____My needs are immediate

Name _____

Company _____ Title _____

Address _____ Phone _____

City _____ State _____ Zip _____

CALCOMP

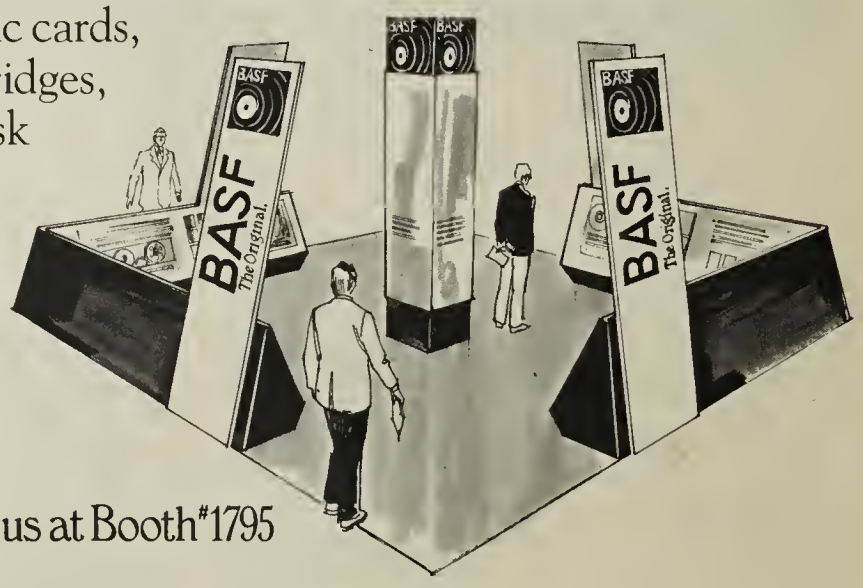
See us at NCC, Booth No. 1233

The newest name in OEM hardware is the oldest name in magnetic media... BASF.

You'll see what we mean at NCC/77 in Dallas. BASF Systems and its parent company, BASF AG of Germany, will be displaying three new OEM minicomputer products: a fixed disk drive, a mini-floppy disk drive, and a random access loader for floppy disks.

Any questions? The BASF booth at NCC/77 will be the place to get the answers. Our technical staff will be on hand to fill you in. And, you'll also see the complete line of BASF information processing media products, including magnetic cards, dictating cassettes, single disk cartridges, digital cassettes, computer tape, disk packs, as well as audio products.

Where and when? At the National Computer Conference, Booth 1795, in Dallas, June 13-17.



Visit us at Booth #1795

BASF The Original.

Computer Tapes Disk Packs Flexydisks Word Processing Supplies

Decentralization Seen Entailing Make-or-Break Choices

By Esther Surden
Of the CW Staff

PHILADELPHIA — Organizations switching from a centralized DP department to decentralization with minis are faced with many management decisions that can make or break the effort, according to Bud Bocher, manager of information services for the marketing department of Consolidated Rail Corp.

Speaking at a recent workshop on the organizational impact of distributed processing, Bocher led attendees through a hypothetical case study of a firm that made the switch, citing all the areas of contention in such a move.

The company used in the study was called Crackling Electronics, Inc., a $500 million multilocation manufacturer of specialized electronics equipment.

The hypothetical company was organized into four divisions, with three divisions responsible for manufacturing and one for assembly.

Each of the divisions was designated a profit center and, with this reorganization, a new vice-president of DP was hired because the former VP couldn't hold down DP costs.

The workshop attendees were told to assume they were vice-presidents of DP and decide if they would continue centralization, but add a charge-back system; separate the DP organizations into the different divisions; combine the two or take some other approach.

After the attendees thought about their answer, Bocher supplied his own solution — a mix of centralized and local processing.

This would minimize hardware expenditures by making use of the existing centralized hardware, centralize processing for the elements common between the divisions and not rely as heavily on communications lines as a terminal-based system would, he explained.

The large batch system could be used for bulk work, but the divisions would have a local installation responsive to the management needs.

The central site, however, would have to produce a "throw away" data set for corporatewide information to be given to each of the divisions, he said.

Assuming that staffing the hypothetical DP departments at the divisions was not difficult, the vice-president of DP would then call a meeting to determine how equipment standards should be established, who should place the orders with manufacturers, if it is necessary to formalize or format any reports and how to establish edit and validity criteria.

Another problem is how the division DP manager should relate to the corporate vice-president of DP, he said.

According to Bocher, any solution should be based on the needs of the individual DP department and "each division evolves its own standards based on what the division general manager requires for support."

However, certain considerations have to be accounted for, he noted, including operating software for compatibility, transfer of programs and the discounts that can be derived from buying the same hardware in multiple units.

Since different general managers will want to see reports and information formatted as they desire, standard formatting of reports is not necessary, he added.

The throwaway data set will provide the kind of information needed by the corporation. Edit and validity standards should be provided by the corporate level, however, he emphasized.

The best approach for the organizational chart to follow is to allow the DP manager in a certain division to report to the general manager of that division, Bocher said.

However, the manager should also have to look to the vice-president of DP for technical and strategy guidelines, he said. This is the most efficient way to keep everyone happy, he indicated, even though it is tricky.

On the division level, the attendees were asked to consider how the DP organization should be arranged. Most of the attendees agreed the division DP department should be organized the way the central department used to be — or the way the DP manager could best get the job done.

CDC's Technotec Receives IAA Citation

MINNEAPOLIS — Technotec, a worldwide technology exchange service of Control Data Corp., has been named "Information Product of the Year" by the Information Industry Association (IIA) in Washington, D.C.

Selected from a field of 31 candidates during IIA's first annual National Information Conference & Exposition, Technotec was cited for "bringing data on the world's technological processes and needs to even the smallest inventor in his garage."

Started in 1975, Technotec is a computer-based service using Control Data's worldwide Cybernet services network.

To use it, an inventor, organization or potential user lists a process, service, product, expertise or need on the data base at a minimum cost of $100 per year for a 1,000-character description.

Someone looking for a particular type of product or service can then search these listings using a telex, TWX, telephone or terminal connection for an average charge of $8 to $10.

After would-be-buyers and sellers locate each other via Technotec, they are free to deal directly. The company does not charge brokerage fees or royalties.

NCIC Classifies Its Active Records

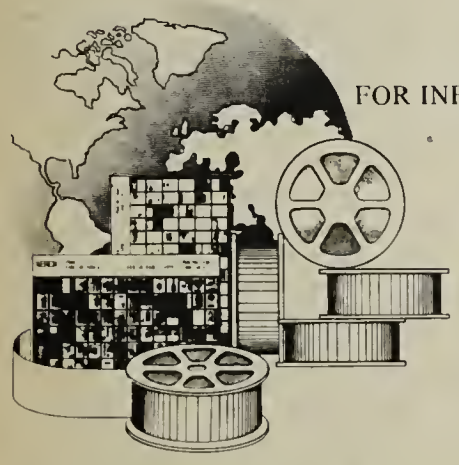
WASHINGTON, D.C. — As of May 1, the National Crime Information Center (NCIC) contained 6,491,850 active records, according to the May issue of the NCIC newsletter.

A breakdown showed 128,019 wanted persons, 851,539 stolen vehicles, 286,637 license plates, 1,131,577 various articles, 1,134,654 guns, 1,933,504 securities, 12,894 boats, 999,727 criminal histories and 13,299 missing persons.

In April, the NCIC network transactions totaled 7,579,080, an average of 252,636 per day. The hour from 9 p.m. to 10 p.m. Eastern Standard Time was the peak hour on NCIC during the month, with an average of 11,810 transactions.

Unscheduled downtime totaled 27.6 hours, or 3.9%.

COMPUTERWORLD
is Available in
MICROFORM



FOR INFORMATION
WRITE:

University Microfilms International

Dept. F.A.
300 North Zeeb Road
Ann Arbor, MI 48106
U.S.A.

Dept. F.A.
18 Bedford Row
London, WC1R 4EJ
England

Managers & Computer Specialists

Interviews at NCC in Dallas

Ground floor opportunities at Texas Instruments' new Management and Technology Center in Lubbock, Texas.

Programmable Product Marketing Engineer
Build and develop retail distribution network. Be responsible for customer training as well as sales and technical support, and end-user sales seminars. Prepare and execute marketing plans for specific vertical markets. Requires good understanding of consumer marketing, plus compatability with both Field Sales Force and Retail Network. Requires a BS in a technical field and 3-4 years experience in related work.

Engineering Manager
P and L responsibility for consumer calculator profit center. Responsibilities include product line definitions, product development, cost reduction and design to cost, product pricing, and market analysis. BS in Engineering with at least 6 years' related experience, including 2 years in management capacity.

Advanced Applications Programmer
Duties include writing, testing and documentation of accounting and financial programs for small business computers. Must have good programming skills, along with some knowledge of business data processing. Requires degree in BA, CS or DP plus knowledge and experience in BASIC Assembly language, and 2 years' experience.

Market Development Analyst
Perform analysis and market research to determine optimal marketing strategies for new computer products, including distribution channels, served markets, service and software requirements, advertising and product positioning, etc. Aggressive personal goals in marketing and product management based on performance are essential. Requires a BS in Engineering or Marketing, plus MBA. Minimum skill requirements include knowledge of computers, programming, and small business DP market.

System Computer Programmer
Specifications, design, coding, integration and debugging of operating systems. Self-checking diagnostics, device service routines, file management, etc., is also required. Work with high level language translators. Requires BS in CS, EE or other relevant technical discipline and, 2-5 years' experience in Assembly language programming. Experience in design and specification writing desirable.

Scientific Programmer
Develop algorithms, microcode, assemblers and simulators supporting LSI microprocessor designs for consumer products. Requires BS, MS in EE, CS, Math, or Physical Science.

Dallas Interviews
For an interview appointment, call John Kearley at (214) 747-2011 on June 12 from Noon-6PM, or June 13, 14, 15 or 16 from 9AM-7PM.

If unable to arrange an interview on these dates, send your resume in complete confidence to **Staffing Manager/Consumer Products Group/P.O. Box 5012, MS. 11/Dallas, Texas 75222.**

TEXAS INSTRUMENTS
INCORPORATED

An equal opportunity employer

The Waves of Change

By Charles P. Lecht

Decentralization in the guise of distributed processing is nothing new – but this time around there are some important differences Lecht believes 'suggest that effective distribution of DP power can be achieved.' This week, in the latest excerpt from his soon-to-be-published book, Lecht explores the problems, the potential and the direction of distributed processing from both users' and vendors' viewpoints.

CHAPTER VI

Like birds flocking from one feeding area to another, today's computer technologists seem to be revisiting an old territory with new hopes for nourishment success. Thus, in the latter 1970s we are once again revisiting the field of decentralized DP.

For as long as I can remember, no one would argue that a distribution of DP resources in such a way as to carefully weave these into the operational fabric of quasi-independent corporate entities wasn't the way to go. But few, if any, companies could hope to support their DP needs this way with past technological offerings.

Today's ever-changing hardware, software and communications environments suggest that effective distribution of DP power can be achieved. This could allow for the fulfillment of the most difficult article in Chapter II's "DP Charter," namely, that "[DP's] success is measured in terms of the proliferation of its capabilities throughout the corporation and the ultimate loss of its own identity as an independent corporate suborganization."

Today, therefore, many corporate entities depending upon centralized corporate DP centers are now lobbying for their own resources in the form of micro- or minicomputers or intelligent terminals. While they are succeeding in many instances, inherent conflicts (among other reasons) with long-term corporate data processing plans are limiting the speed with which they are achieving their goals. We will refer to these entities as end users to distinguish them from the classic centralized DP organizations established to service them.

Such end users frequently think they can solve their problems on their own, which at times they can. However, many learn that doing so entails considerable duplication of effort with other end users or the remaining DP department.

Also rearing its ugly head once again is the de facto long-thought-dead reason for centralization in the first place, that is, the incredibly difficult-to-fulfill requirement that operating entities become involved in matters of technology, including programming, operations, standards and communications. Incompatibility problems, if none others, frequently torpedo any hopes of success.

Many DP organizations, while fully aware of the long-range problems posed by distribution of DP resources, nevertheless accede to today's trend either because of their inability to meet the user departments' growing applications demands or out of simple frustration at turning current embattled situations around.

Whatever the cause, conflicts between end-user departments and centralized DP organizations are arising everywhere, with substantial casualties occurring among the innocent noninvolved.

Today, by the time DP organizations have taken steps to respond to the growing applications development needs of their end users, individual user departments may have already committed themselves irreversibly to independent, stand-alone or distributed processing solutions. The computer industry's shift toward data base and data communications applications further complicates the process of resolving corporate conflicts of this type.

From their own point of view, larger users enjoy certain advantages in this situation which are not shared by small- to medium-scale users. Their greater resources, plus their access to alternate suppliers, tend to minimize the risks to them of an extremely decentralized approach.

In contrast, the small- to medium-size users, lacing in both broad-based experience and resources, can easily commit themselves to short-term solutions which will prove in time to have been more apparent than real.

New Class of Competitor

Until recently, the computer sales representative tended to call on and service centralized DP departments. The latter, immersed in the problems of "keeping things going," discouraged or prevented salespeople from interfacing directly with their end users.

As a consequence of this policy, end users naturally turned to more responsive minicomputer or independent intelligent terminal salespersons who had no prior involvement with DP center management. As this trend continued, major and centralized mainframe vendors found a new class of competitor emerging that established key links with those people in large corporations who are most involved in expediting and installing *new applications* — end users. It is these users which control today's key growth areas for the future.

IBM and some of the other major manufacturers are busily engaged in overcoming this problem as they have been known to overcome similar difficulties in the past. IBM's current product offerings in the distributive network systems area include the 3790 (its principal distributed intelligent terminal system), System/32s or the new System/34s, System/3s and, more recently, the Series/1, along with the Synchronous Data Link Control (SDLC).

These products and concepts are clearly oriented toward *hierarchical* networks with strong counterdependencies between terminals, controllers, multiplexers, concentrators, front-end communications processors and the central *controlling* host IBM mainframes, of which the 3033 is the latest.

IBM appears against any approach which implies "distribution of control," where the network components can be easily replaced by competitor equipment.

IBM Strategy

Obviously, IBM, Univac, Burroughs, Honeywell, NCR et al will stress their brand of distributive processing, offering greater reliability, more growth potential, a higher level of data security and easier implementation. It is possible that this "sales pitch" has some validity.

In IBM's case, however, on the basis of a review of the Telex trial exhibits and of trends emerging from recent IBM announcements and presentations to user groups, one can see the unfolding of that particular giant's "real" communications and distributed processing strategy. In our judgment, it is composed of the following elements:

(1) IBM will protect or lock in all future terminal business wherever possible. The methods employed to achieve this include the creation of host processor dependencies or a "total system" approach where the *full* functionality of the system is not available without IBM-supplied host mainframes, communications processors and their proprietary firmware and software.

The SDLC protocol, which is unique, also supports this strategy since its full details are not available to other vendors. IBM's emphasis on data security and total network system integrity is also directed at frustrating foreign terminal attachments.

(2) IBM will use common building blocks and combine technologies to achieve maximum function-per-dollar, thus greater economy of scale. Some of the methods of implementing this strategy involve the use of "standard universal controllers" (microprocessors) which are adaptable via microcode and software to many different applications.

Another method is the creation of combinations of controllers with specialized I/-O components to produce industry-oriented terminals, such as insurance, banking, medical, education, supermarket, retail and factory data collection distributed processing terminal systems.

(3) IBM will attempt to provide easier migration paths so current terminal users may grow to eventually become total systems customers.

Additionally, wherever possible, the corporation will stimulate add-on business for those customers who currently have IBM host CPUs installed. To implement this strategy, IBM intelligent terminals must be restricted — they will have limited processing capability so as not to impact host systems sales.

Moreover, the application development languages available at the terminal will continue to have heavy, if possible, but at least some central host dependencies.

(4) While in the past IBM has not been prone to playing a leadership role in terminal products, its current continuous stream of these shows it is becoming more and more innovative, creating advanced terminal functions wherever possible.

For example, plasma displays have been introduced for the financial terminal system (Model 3600), and we expect to see this aesthetically pleasing flat panel display put to even greater use in future products.

Inkjet printers (Model 40/46) for the Office Products Division's word-processing market represent another innovation. Touch-sensitive screens for very reliable and easy-to-use factory data collection systems are another case in point.

The more sophisticated, complex, distributed terminal products (such as the IBM 3790, whose price was recently reduced) provide highly integrated features, such as disks, as well as special buffers that can only be customized or configured at the factory (not in the field).

The greater use of LSI circuits and microprogramming techniques, the emphasis on reliability, availability, serviceability and replacement modules for easier, low-cost maintenance and the current "leadership" provided by IBM in the data privacy and security area are other examples of its gradually unfolding product strategy.

(5) Wherever possible, the corporation will obviously attempt to minimize impact on revenues derived from existing, older terminal products, such as the 2740/41, 3270 display, 2780, etc. Its current campaign seems to emphasize purchase of these older products to avoid losses caused by self-impact issues.

Furthermore, one can detect what might be called a "cascade downward" strategy, whereby older products such as the 3270 display are combined with newer products such as the 3790, with such new arrangements intended to help sell the older devices (or, in other words, to unload "old iron").

Confirming this theory is the fact that a new IBM 3270-compatible display terminal was finally introduced on May 18, 1977.

(6) While IBM has and will continue to emphasize distributive processing with some host (or multihost) 370 dependency, this does not mean *continuous* host dependency; i.e., the central CPUs should not be allowed to cause the entire network of terminals or distributive processing systems to fail.

The distribution of processing functions such as data entry, editing, formatting and file updating should allow local operations to continue in a restricted fashion should the host processor(s) become inoperative. A balance will be achieved between total dependency and complete independence from the host CPUs to lock in the customer base without unduly disrupting critical customer operations. (The November 1976 announcement expanding advanced communications functions to support any IBM terminal network connection to any IBM host 370 [or multiple hosts] is a further indication of this concern.)

Distributive Processing Trends

Distributive processing can represent a compromise between centralized and decentralized processing. At the beginning of this chapter, I provided a snapshot of some of the chief issues which have lent impetus to the current distributive processing trend.

Others, not necessarily independent, include:

- The issue of human effectiveness vs. system efficiency (i.e., hardware performance-per-dollar vs. people productivity).
- Political issues, such as the fact that centralized information systems, now a vital part of the headquarters management function in today's decentralized organizational structures, are frustrating control by

decentralized management over its own information systems requirements.

- The fact that control over information means greater political power — in Orwell's *1984* is noted the interlocking relationship between "history" and "he also controls the history books."
- The corporation and its organizational subentities are increasingly dependent on data processing systems in such a way as to make availability and reliability critical issues in some industries (e.g., airlines).
- Data processing's growing percentage of total corporate budgets is causing corporations to seek means to optimize their (i.e., DP's) expenses while caring for and feeding this vital resource.
- Technological improvements and developments (e.g., microprocessors, minicomputers and I/O devices) mean that smaller company organizational units can now afford their own computer, or at least sophisticated terminal systems with full processing capabilities.
- Communications costs have *not* dropped as rapidly as other technology performance-per-unit-of-cost areas (for example, micros, minis, etc.). Therefore, remote access to a centralized DP facility remains costly. (This fact alone, in many cases, represents one of the major causes or forces encouraging the current distributive processing and mini/micro phenomena.)
- Security of DP resources in times when centralized sites are possible targets of dissident groups is a factor in some decisions to distribute the corporation's nerve center and data bases.

Search for Definition

It would be foolhardy to suggest that we may provide an all-inclusive definition of distributive processing for reasons which are clear to the majority of the targets of today's purveyors of such systems. Each company marketing distributive data processing clearly touts products which are distinguished by both dramatic similarities and differences. Certainly distributive DP environments seem to have existed since the mid to late 50s in one form or another, if we include such hierarchically organized systems of hardware/software combines as found in the military, government and large (and/or financially substantial) companies.

Star or ring networks of processors linked by automatic communications (however rudimentary) have been commonplace for over 10 years now. Timesharing environments, supporting remote batch processors which are at the same time computer systems in their own right, would seem to fulfill today's distributive DP concept as well as we know it.

Could it be that distributive DP is not a product but a philosophy, the *commonplace* embodiment of which has been waiting for cheaper hardware, cheaper communications and better software to allow for a more productive sharing of these resources?

I say emphatically yes! Cheaper is here; its companion is, in my opinion, awaiting arrival of the "better software" component to grease the skids for widespread usage.

Similar Notions

In any event, similar to all distributive DP systems seems to be the notions of:

(1) Distribution of *functions* either *locally*, that is, internal to the computer design (e.g., I/O processors, front-end communications processors, etc.), or *remotely* through intelligent terminals which can perform some limited functions.

(2) Distribution of *processing*, that is, local or remote satellite computers, perhaps with a master-slave relationship between a satellite and the host (with or without their own I/O devices and data base).

(3) Distribution of *both processing and control*. Examples include the Arpanet, Univac distributed communications architecture and Control Data Corp. Cybernet systems, where no single host is in total control of the network and all computers within the network can control their own processes.

Three additional dimensions of distributive processing are operations, management and applications development, in the sense that some decision must be reached as to whether these functions should be centralized, decentralized or reflect some combination of the two. Solutions will vary from organization to organization, depending on many factors such as the structural nature of the organization — for example, is it multidivisional or not?

Another factor entering into the distributive processing issue is the logical structure of the applications segment(s) or function(s) to be performed. Are the tasks or functions mutually dependent or independent logical functions?

For example, inventory control systems, personnel systems, manufacturing control systems, order entry systems and accounts receivable or payable systems may be either totally independent or interdependent to a greater or lesser degree.

The logical relationship of the data bases — whether they are integrated or separate data bases — represents yet another controlling factor.

Clearly, the distributive processing decision demands a thorough, trade-off analysis which addresses the following issues (among others):

- The cost of accomplishing a desired processing or logical function.
- The time needed to develop and implement the process.
- The maintenance requirements, controls and standards relating to the process.
- The utility or relative priority of the function or process.
- The expected results and risks associated with a purely centralized, decentralized or distributed approach.

The accompanying table (Figure VI-1) lists some potential advantages and disadvantages associated with principally centralized or decentralized approaches. It is important to realize that this "shopping list" will carry greater or lesser weight depending on the industry or organization doing the shopping.

Clearly, one of the major trade-offs has to be in terms of people effectiveness or productivity vs. cost/performance or hardware efficiency. A company's decision has to be based not only on quantifiable factors, but also on more subjective, qualitative issues.

However, we can say that of all the constraints and factors involved, hardware represents one of the *least* important, whereas software and management issues are *very* significant, perhaps even paramount.

CENTRALIZED	DISTRIBUTED
• Economics of scale: Hardware, software, data, space and talent sharing.	• Lower total system communications costs.
• Easier management and control of operations, standards, application development and data bases.	• Higher availability/reliability.
• Greater growth and expansion of CPU, storage and I/O devices.	• Greater responsiveness, lower overhead and contention.
• Improved total compatibility.	• Smaller incremental costs for expansion and offloading from host.
• Capability to process large, complex applications.	• Easier tailoring to actual end-user requirements.
• Reduces duplication of effort.	• Less divisional dependence on DP.
• Higher total systems communications costs.	• Easier and faster accessibility to local files.
• Lower availability/reliability.	• Lower cost and more effective backup capability.
• Congestion factors — overhead responsiveness, contention over control.	• Flexibility to adapt to future requirements or change.
• Larger incremental expansion steps and costs.	• Higher costs due to duplication of hardware, software, data, space and people.
• Less flexibility or tailoring to end users' needs.	• More difficult management and control of operations, standards, application development and data bases.
• Greater dependence on DP.	• Restricted growth; i.e., CPU power, storage capacity and I/O device selection.
• Restricted and slower access to centralized files.	• Possible incompatibilities.
• Higher cost backup or redundancy.	• Application size and complexity restrictions.
	• Duplication of input, output and functions.

Figure VI-1

The IBM View

IBM sees distributive processing as potentially the best of both of the worlds of centralized and decentralized DP. If the corporate DP department and its end users are viewed as separate entities, then IBM's approach would seem to give end users more flexibility in defining and designing the systems they need while, at the same time, preserving the concept of overall corporate control over end-user activities.

IBM literature on the topic uses concepts and products (Systems Network Architecture, the 3790 intelligent terminal system and Series/1) which seem to support IBM's view of distributive processing as the best of both worlds. Not all customers share this view, but IBM's total product offering in this area is not yet fully visible.

IBM is not intentionally giving up the attractive minicomputer and distributive data processing market to its competitors (the long-anticipated "Peachtree" minicomputer was recently introduced as the Series/1). Indeed, it would behoove certain independent minicomputer and intelligent terminal vendors to study IBM's strategy and objectives more fully; to do otherwise could seriously compromise the profitability of these independents.

The main difference between IBM's approach to distributive processing and that of some of the other major competitors is that IBM apparently believes in *centralized host control* over the network of distributive systems, whereas other vendors, such as Burroughs, Univac, CDC and the minicomputer companies, such as Digital Equipment Corp., in particular, believe in distributed control within networked systems or "netted systems."

Honeywell's current position appears close to IBM's in this regard at this time but may, in fact, provide an intelligent compromise between the two. It is important to understand the distinction between these approaches.

IBM clearly is against the "distribution of control" on business principles; that is, it would like to integrate the host computer, the front end, the network processors and multiplexers, concentrators, remote intelligent controllers or satellite processors and terminals so each of these components and functions is ultimately dependent upon the IBM central host(s) facility.

This strategy frustrates the attempts of plug-compatible vendors to detach or penetrate the IBM customer base and, at the same time, ensures greater total system or network control, improved data security and system integrity and (naturally) greater revenues for IBM.

In contrast, most other major vendors cannot afford to be so restrictive.

Figure VI-1 presents a list of competing philosophy attributes which may be used to identify whether a system may be considered distributed or not. Clearly, it's an unclear issue!

Perhaps the final resolution of distributive DP or nondistributive DP rests in the paradox that "learning to live in two mutually exclusive yet coexisting realities is a necessary attribute of today's top DP manager."

Lecht is the author of four previous books on computer-related matters: The Programmer's Fortran II and IV, The Programmer's Algol, The Programmer's PL/I *and* The Management of Computer Programming Projects.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.

Editorials

NCC and Society

"DP management has an obligation to look into the state of the art because it will impact the primary force in our environment – people."

That's what Dr. Carl Hammer, director of computer sciences at Univac, said before a recent regional meeting of the Data Processing Management Association [CW, May 30].

And one would think that next week's National Computer Conference (NCC) would be a perfect opportunity to discuss the myriad social issues both affecting and effected by the computer industry and computer use.

But that's not the case.

Instead, the American Federation of Information Processing Societies (Afips), which sponsors the annual get-together, has arranged what appears to be a particularly vapid program.

There are only three or four sessions out of a total of 89 that bear any resemblance to the social issues facing the computer community – and, in most cases, those sessions only bear a tenuous relationship to those issues.

Furthermore, although the show is in a new area of the country for NCCs, there seems to be little attempt to get new speakers and new faces on the program. A first glance at the schedule indicates it will contain more of the same from past years instead of innovative and thought-provoking presentations.

Hopefully, we're going to be proven wrong when the NCC convenes, but we do feel Afips could have put together a more original and provocative package of technical sessions for what promises – at least in terms of Afips revenues – to be the most successful NCC yet.

Easing the Burden

The National Bureau of Standards (NBS) has been presented with a study that highlights some of the problems in detecting and correcting errors in computer information systems (see Page 1). End users should welcome the results of the study.

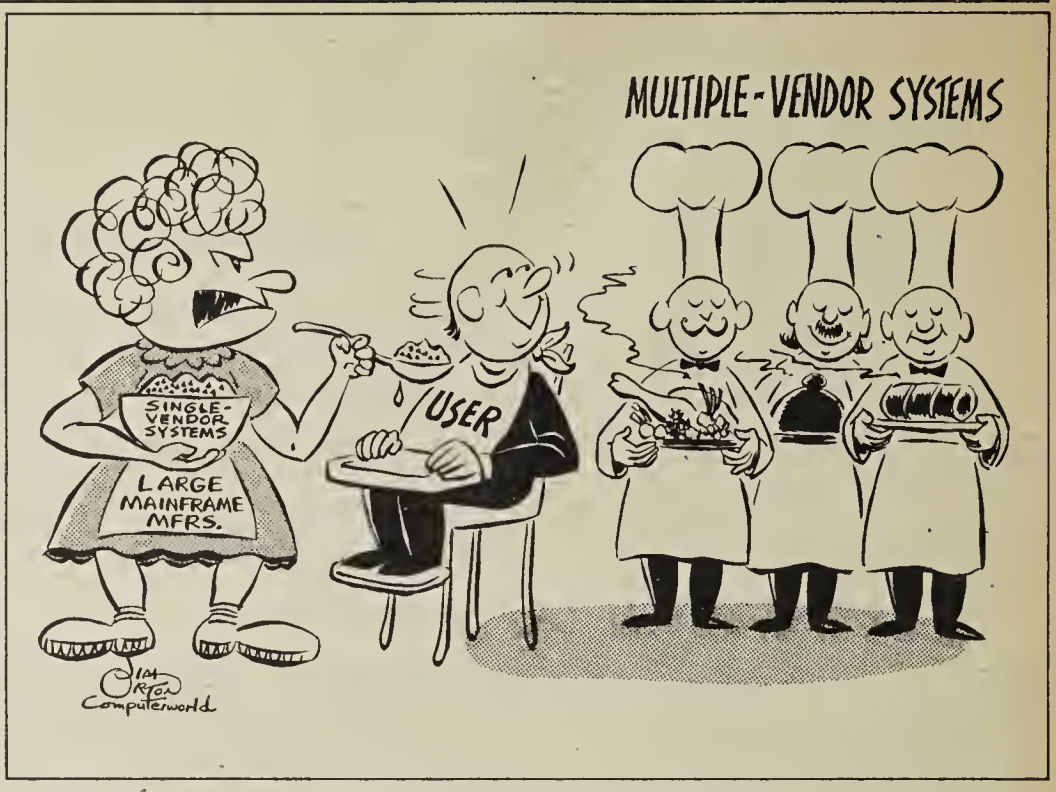
In this time of processors that operate in nanoseconds, it is important for the industry to veer away from its fixation on speed and to concentrate again upon product reliability.

As systems become increasingly complex, it is totally unreasonable to expect the end user to shoulder the entire burden of error detection and correction. Vendors must concentrate on giving the user a system with an unbroken checking trail.

Users must be given the tools to implement effective checking and correction programs. They should especially note the recommendations that manufacturers certify the degree of checking built into hardware and software.

Both users and manufacturers should agree it is the responsibility of the vendor to inform the prospective buyer whether checks are integrated to form an unbroken checking chain or whether some discontinuities exist.

The NBS should adopt the recommendations set forth in the study and implement the procedures necessary to establish the nomenclature and the standardization necessary to promote a commonality for error detection and correction.



'Forget It – You Grew Up on This Stuff!'

Letters to the Editor

Citibank's Decentralized Approach A Difficult Concept to Accept

As I read the article "Mainframes Not Always a Must, Citibank Officer Advises Users" [CW, May 16], I was reminded of a lecture I once attended on the subject of how not to design systems.

I cannot dispute the statement that Citibank's decentralized DP facilities have saved $80 million; but as a systems man, I find it difficult to accept the idea that "a raft of nonstandardized systems" made up of "equipment ranging from Burroughs to Wang, and just about everything in between" is any kind of substitute for a standardized, coherent and secure decentralized banking system.

Naturally, without the details, I feel somewhat uncomfortable criticizing Citibank's approach. However, there were statements quoted in the article about the problems encountered with its centralized system that clearly point to deficiencies in the systems design area.

First, there was the statement which said, in effect, that in the old system Citibank "undertook only two or three major projects per year. Of those, one failed and one was late." Most experts in the field list this problem as a major indicator of poor systems development techniques.

Also, it seems there were serious problems in the area of operations: "costs getting out of control," "backlogs growing" and "the system being too volume-sensitive."

As for the decentralized system, I am willing to bet that one good reason why people now have "no problem getting computer time" is that there are now 10 somewhat underutilized "toys" available for play.

However, what worries me the most is the problem of security. The article implied each "system" is autonomous. With today's worry over security and privacy of DP systems and the threat posed by the so-called "DP criminal," I cringe at the thought of a bank that has 10 computer facilities, each doing its own thing, with no central control.

I hope I am wrong in my understanding of Citibank's system; but, if I'm not, I respectfully suggest Citibank consider securing the services of a competent systems consultant to perform a computer center audit as soon as possible.

C. Victor Gouger Jr.
Concord, N.H.

Riding the Crest of Success

Charles Lecht's *The Waves of Change* is the best piece *Computerworld* has ever published. Encore!

Wm. Courington
Stanford, Calif.

Attack the Cause of the Problem

Alan Taylor has once again provided us with an awesomely detailed analysis of yet another of life's major problems – airline overbooking ["Airlines Make Advance With Overbooking Disclosure," CW, May 2].

And, once again, he has struck a mighty blow at the symptom rather than the cause of the problem.

Perhaps if the same amount of effort by Taylor and others were directed at those persons who make reservations and don't bother to cancel or keep them, we could deal more effectively with the cause of the problem.

The box accompanying his article would have been more appropriately titled "Airline Reservations: Keep Them or Cancel Them."

Robert S. Asquith
Palo Alto, Calif.

(Other letters on Page 30.)

Data Past

Five Years Ago
June 7, 1972

PHILADELPHIA – Univac introduced the 8460 disk storage subsystem, designed for users who needed large-capacity, on-line information files. Up to 2.2 billion characters of storage could be kept on-line and available in an average access time of 55 msec at an average transfer rate of 3M bit/sec.

– – –

WASHINGTON, D.C. – Senate probers investigated the operations of the Medical Information Bureau, which was said to maintain a computer-based data bank of health information on at least 11 million U.S. citizens.

Eight Years Ago
June 11, 1969

LOS ANGELES – Judge Robert W. Kenny of the Los Angeles Superior Court decided the Southern California Retailers Credit Service Co. had the legal right to assert a claim for $1 million punitive damages and over $2 million total damages against Statistical Tabulating Corp., a large commercial computerized service bureau.

The judge upheld Retailers Credit's right to punitive damages for the defendant's failure to deliver the credit company's customer files that were kept on magnetic tape and to deliver, in accordance with contractual agreement, the program developed by Statistical Tabulating to process the files.

– – –

NEW YORK – Programmatics said in court it was not in a financial position to outlast the effects of IBM's software policies. The firm said it might be completely destroyed unless IBM were forced to charge for its DOS Sort or withdraw it.

COMPUTERWORLD

. . . the one weekly newspaper that's designed to fulfill your unique "need to know". . . the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress. . . 52 weeks of incisive news, commentary and special reports. . . subscribe today, use the attached postage paid order form.

☐ **Please enter my subscription**
(details on back)

☐ **I'm already a subscriber, but I'd like you to change my:**
- ☐ address
- ☐ title
- ☐ industry
- ☐ other

My current mailing label is attached and I've filled in new information on the other side.

Put old label or label information here

Please send me COMPUTERWORLD for 1 year RATES: U.S. - $15 Canada and PUAS - $23 Other foreign - $40

☐ Check Enclosed

☐ Charge My American Express Account If charge we must have cardholder's signature:

Signature: _____

Expiration Date: _____

First Initial	Middle Initial	Surname	
Your Title			
Company Name			
Mail To:			
City	State	Zip Code	

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld.*

COMPUTERWORLD

CIRCULATION DEPT. 797 Washington Street, Newton, Mass. 02160

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS/INDUSTRY

10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other: _____

TITLE/OCCUPATION/FUNCTION

11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other: _____

Detach here, fold, and place in post-paid envelope attached through binding.

Low-Cost Systems Give Program Power to the People

By Jack Stone
Special to Computerworld

For years we have been subjected to science fiction stories in which Harry Homeowner and Henrietta Housewife are served by large-scale computing facilities that are packaged in wristwatch-like devices.

Although our industry has been incredibly successful at expanding computing capabilities while reducing costs and package size, there's still quite a way left to go before the ultraultramicrocomputer becomes a reality.

Yet, many of us believe it is only a matter of time before the majority of Americans are served by the family processor.

On the other hand, one wonders when (or if) the vast reaches of our population will (or should) have a programming facility.

There are, to be sure, market factors that are encouraging growth in this direction.

First, nearly all of the colleges and universities and most of the high schools teach programming in one form or another. Hopefully, this experience is a positive one for most students and will stimulate interest in carrying computer technology into the home.

Converting Skeptics

Second, the personal computing business is expanding rapidly in the consumer market, awakening new interest in computing from converted skeptics.

Third, the small business person has become vitally interested in computing machinery. If his or her experience has been successful, then we can expect moral support at least for family DP applications from this sector.

Finally, and perhaps the most important, the microcomputer vendors are just doing a first-rate job in merchandising small programmable machines with packaged software and introductory-level texts on programming. (If you haven't already done so, you must visit your local personal computing retailer and feast your eyes on some of the most spectacular technology around.)

Growing Fascination

I became fascinated with microprocessors during the design phase of a rather interesting training program I am currently implementing (and will report on in future columns) that deals with English-language DP training of Middle Eastern students whose English-language fluency is limited.

Suffice it to say here that such training is obviously extremely difficult and, to be effective at all, must incorporate the very best ideas in instructional strategies.

Although all of the students in the class have had some DP background, and several are skilled Cobol programmers, the program called for a review of DP systems from the very beginning to assure that all of the students understand DP concepts in the English-language context.

Naturally, I will use the full gamut of audio-visual materials and workbooks for both instructor-led and laboratory sessions of the program and on-line terminals for the Cobol training.

But as I pondered over the sections dealing with programming concepts, I felt that I needed instructional support that included some kind of new machine capability — one that was extremely limited in size, but demonstrated all of the basic programming concepts and techniques.

Deciding What to Demonstrate

So, I set about my task by asking the question: What do we really want to demonstrate in a basic programming concepts course? We want to start with elementary programs involving the basic arithmetic functions, certainly, and then proceed to chained calculations.

This subject naturally leads to the idea of algebraic hierarchy and showing the students how to handle algebraic expressions. We want to illustrate the handling of numbers in both fixed point and exponential forms.

Then, perhaps, the students should observe the use of the single variable functions such as common and natural logarithms,

The Human Connection

squares and square roots, integers and reciprocals and the trigonometric functions. It would also be desirable to show some more complex functions in action, such as raising a number to an arbitrary power and its inverse, means and standard deviations and polar/rectangular conversions.

During the process of performing these calculations, the students would, of course, be introduced to the notions of input, accumulating register, process and output.

Now, we should be ready to proceed with more complex programming exercises. We should have the ability to address general-purpose registers and the facility to perform register-to-register arithmetic. We should give the students a reasonable main storage capability for program residence.

Also, the students should be able to interact with the machine system in the "hands-on" manner. Program execution should be in the interpretive mode, and the system should allow the student to control execution through single step or pause facilities.

The machine should have the capability to handle conditional and unconditional branching and subroutines. The instructional repertoire should be the minimum necessary to demonstrate these techniques and should require the absolute minimum coding.

The machine should be supported with a well-written user's guide, sample programs and, if possible, a primer on programming oriented to the machine.

Finally, the machine should arrive at the door for extremely low cost.

Well, my search was fruitful. I found a product that met nearly all of my needs.

The machine features include algebraic entry, algebraic heirarchy up to seven levels, 12-digit accuracy for mathematical calculations, fixed-point calculations displayed up to eight decimal places, numbers exponentiated to the 99th power, 10 data registers plus one accumulating register with display output.

Other features include 100-char. memory for program storage, variable-length instructions, 23 built-in functions, three unconditional and four conditional transfer instructions, two loop-control instructions and four levels of subroutines.

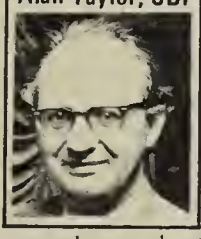
The system comes with a complete owner's manual, an applications library of 5 programs dealing with math, statistics, finance, electrical engineering, navigation, and a programming workbook for users with little or no previous experience.

This product, which now functions as my family's computer system, is the Texas Instruments, Inc. Key Programmable Slide-Rule Calculator, SR-56. I purchased it from that little electronics curio shop — next to the corner drugstore — for $79.95 complete.

Based on Four Files

Security Designs Let Applications Protect Themselves

The Taylor Report
By
Alan Taylor, CDP



Computer applications security is a major topic.

You can hardly open any trade paper without seeing references to how security keys, passwords, rings, authority structures, etc. are being used, or else to how futile they are in the face of growing computer crime worries.

Yet, despite the interest that lots of people have, the idea seems to be how to protect any computer program, rather than how to design the program so it will protect itself.

Personally, I like the idea of having a program — or rather, application — protecting itself. The application, after all, knows much more about itself than any operating system designer does. This knowledge can find ways to guard against people attacking the application that can be quite ingenious, without being incredibly time-consuming.

Four Basic Files

The security design that can be installed as a subsystem of an application is based upon four files — three that are quite obvious and one that may be new.

The obvious files include the Expected Usage History File, the Unexpected Usage History File and the Authority for Unexpected Usage File.

The unobvious file that has to be developed in some form or another is the Rumor File.

The Expected Usage History File contains details of usage of the various key elements — both programs and files — that are expected to be direct or indirect targets of attack. This file retains some significant data regarding usage characteristics, volume of input, frequency of run, type of associated operations, nature of person who would authorize type of run, proper method of disposition of outputs, etc.

The data is kept separately for each of the expected usage categories and normally includes production, testing, modification, auditing, etc.

Unexpected History

The Unexpected History Usage File is developed by noting actual usage (from the machine logs) of any of the critical elements, after setting up the actual reports against the rules for the expected operations and finding activities that fall outside these areas.

Practically, of course, there are many reasons for unexpected operations. Hardware or software errors which cause a rerun, for instance, come immediately to mind. Peak-month or year-end operations may increase the usage of some on-line operation (which also can be monitored in the same way).

Whatever you immediately think are the limits of expected operations, you can be sure there are frequent other usages. All these appear in time and should then fall into the unexpected history file. This is then held for developing both a greater understanding about what is going on and also for improving the expected history file — going so far as to permit the expected usages to be checked against the actuals with comparative ease.

Result of File Comparison

Obviously, the Authority for Unexpected Usage File is the result of the comparison of the other two files with the authority known for the unexpected usage. These authorities can be the computer operator or the maintenance programmer. An authority does not have to be given ahead of the event because to do so is a frequntly impractical concept to follow in practice.

Practically, it will be found that many items cannot really be specifically authorized — such as a too-frequent use of some part of the program for "testing." Indeed, they don't need individual authorization.

However, when the pattern of usage is put together, there may be something unusual which, if it trips some application-developed criteria, can result in matters being included in an Unexpected and Unauthorized History Report.

Of course, there may be nothing at all wrong with the unexpected operations, but if it is a security effort and if the pattern is wrong, then someone should look at it. The application would be policing itself and doing it with knowledge of itself.

In policing its activity, some room for reasonable changes in activity volumes have to be given. Sometimes, however, certain areas can do with closer scrutiny than usual; that is where the Rumor File comes in.

The Rumor File

A major problem in our professional ethics is that because of the power and occurrence of computer crime and because of the various ways different professional people in an installation can see what is going on, there is the question of what to do when it appears there is something not quite right in operation.

On the one hand, as professionals, many codes ask us to keep absolutely confidential anything we learn or surmise about other applications. Yet, at the same time, other ethical codes call upon us to report to the appropriate authority anything which seems wrong.

The two concepts conflict, as the developers and commentators on professional ethics have frequently discovered. It is simply too late to wait until one is certain that something is going wrong, and it is equally wrong to rush in.

Just who is the "appropriate authority" when you wonder whether a systems design has been played with?

Solution to Conflict

The Rumor File for a particular application is a solution to this. It provides a method which can simply result in scrutiny being increased in certain areas after they have been pointed out to be acting in an unexpected way, which has drawn attention to them.

Access to the file can quite properly be anonymous — which solves the ethical problem — and the very name of the file means that no one expects the comments in an anonymous letter to be taken as gospel.

The Rumor File can itself be partially computerized. It is certainly a lot harder to trace usage of a console to put a message into a file where there are definite precautions to keep the file access (but not recovery) open, than it is to guess about the handwriting of a letter.

With such a system, we can solve the ethical problems and improve the danger of detection, thus discouraging improper operations and improving the security of the operation. That's quite a good result.

By doing it with an understanding of the application, it is also possible to keep the mass of work in the hands of the computer and keep the costs way down.

© Copyright 1977 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of *Computerworld*.

To the executive who knows a DBMS is not a German sports car:

You're concerned about database management. You know that a standard CODASYL-compliant DBMS is a must. It's the only way many separate though related data entry and processing functions are ever going to be tied together in an integrated system. In other words, you've gone beyond asking "What if?", and are trying to answer, "How?"

If the answers you've come up with so far are too light on handling and horsepower, and too heavy on price: Prime can help.

We offer a family of interactive data processing systems that quite literally provide mainframe functionality at less than one-tenth the price. They are designed to coexist with your present computer so you can optimize its batch processing performance by letting a Prime system off-load on-line interactive tasks.

Prime computers feature CODASYL-compliant DBMS software as well as industry-standard languages like ANSI '74 COBOL, RPG II, BASIC, and FORTRAN IV. They offer massive memory capacity: up to eight million bytes of main memory, 2.4 billion bytes of disk and 512 million bytes per user of virtual memory. And, since Prime computers are multiuser systems, one computer can simultaneously handle up to 63 users involved in such diverse activities as RJE communication, forms processing, on-line data entry, and computational time-sharing—in addition to database management.

To fully appreciate the performance of a Prime computer, we suggest a test drive. Contact J. D'Angelo, Marketing Manager, (617) 879-2960, or your nearest Prime office.

PRIME

Prime can help

Conflict Over Structured Methodology Goes On . . .

Reader Commentary

By Gopal Kapur
Special to Computerworld

During the past few years, a large number of conflicting articles have been published on the subject of structured methodology. It all seems to have started with the paper by Dijkstra in the *Communications of ACM* (March 1968) entitled "GOTO Statements Considered Harmful."

This was followed with a paper by Knuth (Stanford University) who told us how to avoid GOTO statements in our programs *(Information Processing Letters,* February 1971).

These two articles caused a "bandwagon" syndrome as author after author wrote articles and books praising the glorious results of coded programs without GOTO statements.

These authors attempted to tell the reader that coding without any GOTO statements will surely emancipate the programmer from poorly designed programs, and all programs will become easy to read, easy to understand and easy to maintain.

The bubble was burst in 1974 when Knuth told us of ways to write structured programs with GOTO statements (STAN-CS74-416). And then there were the statements from many programming pundits (Association of Computing Machinery [ACM] annual conference 1977; 1975; National Computer Conference [NCC] 1974, 1975 and 1976) that Dijkstra's paper on GOTO was grossly misinterpreted.

As if the discussion of GOTO and no GOTO did not cause enough confusion, there was the article expounding on the virtues of COME FROM (Clark, *Datamation,* December 1973). There is still some speculation over whether the article was serious or tongue-in-cheek.

This was followed by "The 'Else' Must Go, Too" (Bloom, *Datamation,* May 1975).

I am breathlessly awaiting an article on 'Dynamic Sneak-By.'

Conflicting Views

Some have called structured methodology nothing but warmed-over modular programming while others have dubbed it a revolution (McCracken, D.D., "Revolution in Programming: An Overview," *Datamation,* December 1973).

Added to these conflicting and often confusing viewpoints are the publications telling us that structured programming really means to rally around a superprogrammer (the chief programmer) and form teams, aided by a backup programmer and a program librarian.

We have been enlightened on the ways to achieve *programming nirvana:* create Hipo diagrams, write upteem levels of nested IF statements and communicate in Pidgin English.

Weinberg told us to forego our egos and walk through everybody's code (some severely scarred programmers dubbed the process a walk-on).

Then there is the imported (must-be-better) school telling us about how Warnier Bracket Diagrams and laws for construction of programs (LCP) are really where it's at. There are those who swear by Chapin Charts, others who swear at them while vigorously waving a copy of the Nassi-Schneiderman Charts (ACM Sigplan Notices, August 1973).

Buzzword Problems

Recently, a DP manager, harried after viewing an audio-visual presentation on structured methodology, called to ask what the terms "design heuristics," "program morphology," "skew-in and skew-out," "efferent" and "afferent" meant.

Why the coining of all these new buzzwords? he fumed. Are these people really concerned with helping develop a better methodology, or are they doing this to carve a nitch in the much-rumored Coding Hall of Fame (said to be located underground somewhere near Poughkeepsie).

In his disgust, he said, "They can take their heuristics, morphology, skews, nested IF and the like and GOTO..."

The entire programming profession is being beseiged, he said. In his opinion, "structured programming was nothing more than the social disease of DP ills."

IBM told us that the chief programmer team concept and structured programming really work and backed their claim by citing the *New York Times* project (F.T. Baker, chief programmer team management of production programming, *IBM System Journal* 11,1, 1972; Systems Quality through Structured Programming, Proceedings of Afips 1972 FJCC).

These claims were of course questioned and, at times, even refuted as being far from the truth (Edward Yourdan, Peter Denning, 1975 NCC panel discussion; "Rules Not Helpful All the Time," *CW,* June 4, 1975; "Who Said What to Whom," *CW,* July 1975; Yourdan, "Letters to the Editor," *CW,* Nov. 12, 1975).

In the midst of these claims and counterclaims, there was the letter from three members of the *New York Times* declaring Baker's original claims to be somewhat self-serving and misleading. We were also told how the top-down approach was really better than the bottom-up approach (the *Kama Sutra* gives bottom-up a bit higher rating).

Confusion and Alarm

All of this caused much confusion and great alarm among programming groups and DP managers as the entire vocabulary of new words meant certain obsolesence. Not that the average programming shop is that hot on theoretical subjects to begin with.

The real mystery is why there is so little discussion anywhere on composite analysis as described by Myers. He is, in fact, about the only author who has quantified the criteria for evaluating the "goodness" of a program.

In my personal interviews with scores of programmers, analysts, project leaders and DP managers, it is apparent many have a misunderstanding of structured methodology. They occasionally base their judgment on misconceptions and poor information spewed out by the new (self-proclaimed) pundits who are often nothing more than oral flashers.

At times, there is even a subtle fear of this new methodology among experienced programmers and analysts. Some of the disadvantages cited are: lack of proper definition of the methodology; the need for additional personnel and increased computer resources to develop and test structured programs; unsuccessful structured walk-throughs; methodology that does not really fit their environment.

Some mentioned their department was too small, while others rejected it because their group was too large.

A large majority of the managers interviewed expressed a need to know the experiences of other departments who have tried structured methodology. They wanted to hear about the experiences of some nonbiased parties (other than vendor representatives, educational consulting firms, book publishers and in-house training coordinators).

Areas of Interest

They were interested in learning about other installations' experiences with structured design and structured programming, including design tools being used, workable standards and guidelines, productivity measurement methods, project estimating, progress reporting and work evaluation methods.

They wanted to know the effects of structured methodology on cost, quality and programmer attitude. They were interested in knowing the most effective ways to introduce structured methodology to their staff.

And then there is the perennial question: "Will it help us in our heavy maintenance environment?" Under these circumstances it is imperative that DP managers and practitioners develop a clear understanding of structured methodology's implications, advantages and disadvantages, and pitfalls.

Fall Conference Planned

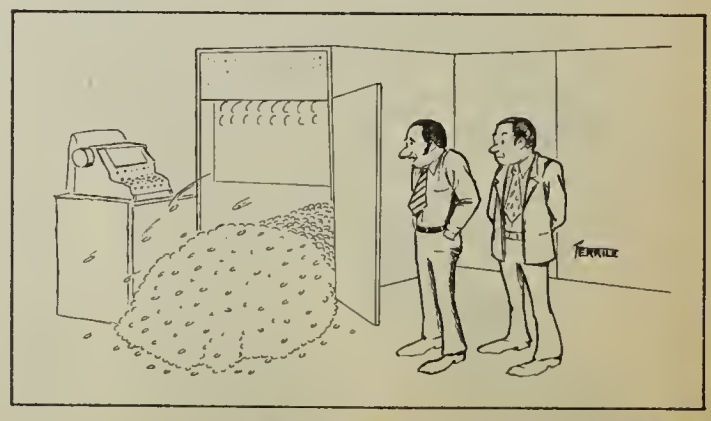
Plans for a conference sometime next fall are underway. The aim is to provide the DP professionals with a complete and objective analysis and evaluation of structured methodology as used by the business DP community.

Conference topics will include:

- Definition of the methodology and techniques in use.
- Usefulness of various components and tools of structured methodology.
- Advantages and disadvantages as experienced by users.
- Effects (pro and con) of structured methodology on programming activity and programmers.
- Effective methods of introducing structured methodology to the programming, analyst and supervisory staff.
- Present and future trends in the develoment of structured methodology.

Interested DP managers and programmer/analysts are invited to write to me at Kapur & Associates, Inc., 776 El Cerro Blvd., Danville, Calif. 94526. A wide participation will greatly enhance the quality of the conference and the conference proceedings.

Kapur is president of Kapur & Associates, Inc.



'I Don't Know . . . I've Never Gotten a Core Dump Quite Like This Before.'

RECYCLE
IBM CARTRIDGES

Recycle your IBM Porkchop or Harmonica cartridge ribbons

aspen ribbons

FREE SAMPLE OFFER
Two Ribbons Recycled Free of Charge! Dealer inquiries welcomed
(303) 444-4054
1700 N. 55th St. / Boulder, CO 80301

Announcing
The June System Management Software Seminar Series.

If you're responsible for the management of systems and operations, you'll want to attend our one-day system management software seminar in your area.

You'll learn about the tools available to help you measure, account for, tune and control your computer hardware and software.

You'll learn how you can quickly and easily:
- forecast hardware/software needs
- account for all hardware utilization
- do accurate budgeting, forecasting, and trend analysis
- determine where optimization efforts will yield maximum return
- provide your management with a concise picture of computer workload

Learn the facts on total computer performance as well as total resource utilization and accounting. Call us today to confirm your reservations for the complimentary seminar and luncheon.

Date	Seminar Location
June 14	Boston 201/871-3550
June 15	New York City 212/868-1614
June 16	Pittsburgh 313/569-3550
June 17	Washington, D.C. 703/527-3332
June 21	Atlanta 404/577-8642
June 22	Chicago 312/298-6520
June 23	St. Louis 314/434-5100
June 24	Dallas 214/634-8400
June 28	Los Angeles 213/822-9911
June 29	San Francisco 415/885-1888

In California: 408/735-9550
Outside California dial toll free: 800/538-1872

Boole & Babbage

Boole & Babbage Inc.
850 Stewart Drive
Sunnyvale, California 94086
Member SIA

The Other Side of the Argument

Proposed I/O Interface Standard Will Hurt Innovation

By Herman Lukoff
Special to Computerworld

The May 2 editorial that stated the mainframe manufacturers are acting to suppress the proposed I/O interface standard cannot go unanswered. *Computerworld* presented only one side of the issue. Some of the facets of the other side are discussed below.

The Computer & Communications Industry Association (CCIA) is attempting to prove that technical innovation will not be stifled because:

1. IBM has been using the proposed standard interface since 1963 and is still using the same interface on the firm's latest equipment.

Response: The 3033 CPU is a plug-compatible replacement for an earlier model machine. Compatibility requirements force use of the same interface.

IBM provides no guarantees that future product lines will use the same interface.

2. Amdahl and Cray Research have built advanced machines using the interface and have not been stifled.

Response: Amdahl has targeted its CPU to be a plug-compatible replacement for an IBM mainframe. Obviously, the IBM interface would have to be used. The Cray machine is a "number cruncher" and all resources have been committed to speeding up the CPU.

The point is that some smaller mainframe companies are willing to devote their limited resources to improving one aspect of the system—the CPU—and ignore I/O performance. With a fixed I/O interface, it is indeed possible to innovate faster processors, but this is of minor interest to the majority of DP users who are I/O-limited.

3. The AS series of computers from Itel Corp. use the standard interface.

Response: These mainframes are targeted toward direct replacement of IBM mainframes and obviously have to use the same interface. They represent little in the way of innovation.

4. The Univac 90 series also employs the same I/O channel with minute modifications.

Response: This is true. Univac is strongly against standardizing on the interface, even though it would cost little in design efforts to do so.

Con Arguments

The CCIA hasn't proven a thing with the examples cited. The arguments against standardizing the I/O interface are as follows:

• The interface is 14 years old. This period covers several generations of computer systems.

Data rates through the I/O channel have increased by an order of magnitude or more. The interface has served well during this period and has been able to keep up to needs through improvements and additions to the channel.

But these types of improvements can only be carried so far before other problems appear and become a limiting factor.

For example, the overhead functions in the interface will become unbearable in the future. The handshaking takes too great a proportion of the data transfer time. The fact that the interface has held forth for 14 years provides no guarantees that it is adequate for the future.

• The I/O interface is embedded in the very heart of our computer architecture. The CPU and memory are separated from the I/O control units by the I/O interface. Systems performance is measured by throughput, that is, the ability of the entire system to do a customer's job, and this is obtained by balancing the mainframe and I/O capabilities.

New architectures consider the trade-offs of placing functions in the CPU vs. placing them in the I/O. The trend, in fact, is to unload the CPU as much as possible by putting more intelligence into the I/O control units.

To reduce costs for the user's benefit in smaller systems, the tendency is to eliminate the channel interface completely by integrating the control into the CPU. In very high performance I/O, we wish to design special channels that operate at high speeds and greatly reduce the time wasted in channel "handshaking."

With the event of distributed processing looming on the horizon, we may want to provide quite different functions in the I/O control units.

Optical fiber data links now verge on practicality. The great benefits in optical data links are achieved by using a serial channel and not the parallel paths used in the proposed standard.

By standardizing on the I/O interface, such innovations discussed above are greatly impeded—if not eliminated altogether.

Once the signals and functions on the I/O interface are frozen, the die is cast for continuing present I/O architecture, with only small improvements likely.

Same Transmission

In layman's terms, standardizing on the I/O interface would be the equivalent of saying all automobiles have to use the same transmission. This would directly prevent the automobile manufacturers from providing trade-offs in the transport system between engine performance, drive shaft and differential gear ratios and wheel design.

The transmission can be thought of as the I/O interface between the drive shaft, differential and wheels (output devices) and the engine (CPU).

No one has directed such standardization toward the "innards" of an automobile. Instead, such standardization has occurred at the periphery of the automobile where easy interfaces exist—the battery, tires, lights and fuel supply.

The I/O interfaces embedded deep in the computer system between the channels in the CPU and the control units have been the target for standardization only because they are digital and relatively easy to describe. The far more logical point of standardization is at the peripheral devices, but these have difficult analog interfaces in many cases, and the risk of unsuccessful interconnection is high.

• While it is true that there would be greater competition and lower prices to the user with I/O interface standardization, such gains are relatively small and shortsighted. Competition might bring about immediate savings of 15% or so compared with order-of-magnitude reductions in cost that technology can bring.

A quick reference to the cost per bit of disk storage shows such dramatic reductions in cost over a relatively short period.

PCMs Flourishing

• While there has been no official I/O interface standard, this has not stopped the plug-compatible manufacturers' (PCM) market from flourishing. PCM peripherals have been developed for all the mainframe manufacturers' systems, but IBM, commanding the lion's share of the market, has obviously been the prime target.

No one is stopping the PCMs from second sourcing if they have the ability to do so.

• The establishment of the I/O interface will freeze the control unit and peripheral area for a longer period, making it easier to copy.

With potential for higher volume, the area will look particularly attractive to foreign manufacturers, especially those in Japan which have the expertise and may readily undersell American manufacturers.

The computer industry can well be moved offshore by the standardizing action. It has happened with television to such an extent that the U.S. and Japan are now negotiating a trade agreement to limit imports.

• The suggestion that mainframe manufacturers get together and standardize on a new interface is not a practical recommendation.

The reasons are stated in the argument above that the I/O interface is embedded in the very heart of our new systems architecture and such innovation constitutes confidential information — trade secrets — that lead to technical competition and competitive advantage, all to the ultimate benefit of the user.

I/O interface specifications cannot be derived in a vacuum—that is, by having manufacturers get together at a meeting. The I/O is an intricate part of a systems design that must be defined early in the design cycle, which can easily extend for five years.

The chances of having all mainframe vendors synchronized to start a major systems design cycle are very small. Further, what is optimal for one mainframe vendor will not be optimal for another.

• Arguments have been advanced that the proposed I/O standard interface will only be required as a minimum; other innovative I/O interfaces can coexist.

Why should mainframers complain about stifling technology if this is the case?

The existence of two I/O interfaces in a system presents a compromise. It costs something to allow for the interface even if it is not used.

The costs are not insignificant; thus, the cost to the customer who needs only one interface must be higher. IBM, if it decides to continue with the one interface, would have a decided advantage over other manufacturers, which would have to have two.

Also, how long would the government agencies forced to use the standard continue to do so when superior performance would be achieved with the nonstandard interface already on their premises?

The above arguments aren't going to convince some in the CCIA, but it may help convince the intelligent computer user that technological innovation will buy him more in the long run.

Finally, the statement is made, "The real reason the mainframers do not want a standard is so they can better control their users and make sure those users purchase peripheral units only from the

(Continued on Page 30)

Reader Commentary

370/135 (240K)

$3,200/MONTH

Features include floating point, 1403 IPA, 2319 IFA, 1 Selector Channel, 3215 Console, 3046 Power Unit, other extras.

Seeking a 5-year sublease; will consider shorter period. Flexible terms.

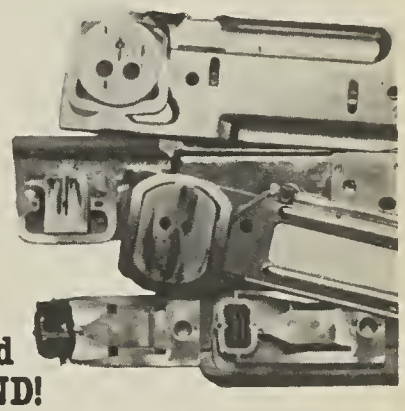
IMMEDIATE AVAILABILITY

Larry Gunther (617) 864-5770

ARTHUR D. LITTLE, INC.

Refurbish or Replace?

Why scrap a "crashed" head... when it can be refurbished to "like new" condition at significant savings and fast turnaround by INFOEXTEND!



INFOEXTEND is a new group of Information Magnetics Corporation (INFOMAG) who is the world's largest independent disc head manufacturer. It is formed and organized to provide its customers with the equivalent of new disc heads at substantial savings and fast turnaround (1—2 weeks).

All types of disc heads can be refurbished. There are no tooling charges. All heads are inspected and refurbished for mechanical and dynamic electrical compliance on equipment/tooling identical to those used to manufacture new heads. The refurbished heads will carry INFOMAG's one year new head warranty.

IM

INFOEXTEND
Information Magnetics Corporation
495 South Fairview Ave./Goleta, CA 93017
Tel. (805) 964-6828/TWX 910-334-1171

NOW EXPANDED DIBOL®

with a PUNCH...

IAS's unique, low-cost, software package enables DEC Datasystem 300 Family users to maximize their hardware with:

• VIRTUAL MEMORY • MEMORY MANAGEMENT
• INCREASED THRU-PUT • MULTI-TERMINAL PROGRAM DEVELOPMENT

Here's how it knocks out your problems:

ONE .... Expands your hardware capacity
TWO .... Optimizes execution of your software
THREE .. Allows a greater number of terminals
FOUR ... Reduces disk contention
FIVE .... Maintains full compatability with DEC hardware and software
SIX ..... Enables program development concurrent with running applications
SEVEN .. Editing and linking from any and all terminals
EIGHT .. Installs in minutes on your system
NINE ... Reduces programming time significantly
TEN .... Full responsive support is provided

CALL FOR FULL DETAILS AND/OR A DEMONSTRATION

IAS Information Access Systems
1140 Bloomfield Avenue, West Caldwell, N.J. 07006
(201) 575-6464

WYLBUR™ is ten-times more cost-effective than TSO!

...And WYLBUR can prove it to you in your own office through our unique Dial-A-Demo™ service.

- WYLBUR, the conversational, on-line program development system, has great text editing and RJE/O features which will make your staff more productive; will help you reduce system development and maintenance time.
- WYLBUR minimizes CPU overhead associated with telecommunications and user management. This means you can have the benefits of a program development system on-line without hampering through-put received by existing systems.
- English-like commands, which are easy to learn and to use, allow your personnel to become effective WYLBUR users in less than one day.
- Developed by Stanford University, WYLBUR, by agreement with Stanford, now is available with full support, including installation. No modifications to host operating systems are required.

Want proof? Enjoy a lively two-way conversation with WYLBUR. Call today for a Dial-A-Demo time reservation. If you're considering systems like TSO, ROSCOE, VSPC, CMS or CRJE, call us. Even if you already are using TSO, WYLBUR is complementary and will save you time and dollars. Telephone (415) 391-9555.

On-Line Business Systems, Inc.
115 Sansome Street, San Francisco, CA 94104 • Telephone: (415) 391-9555

Letters to the Editor

NCR Has Not Yet Requested Validation for Its Compiler

The first article in the Cobol on minis series ["Growth of Cobol: Signal of Trend to Distributed DP?", CW, April 25] contained a minor misquote regarding NCR Corp.'s 8200 Cobol '74 compiler.

The statement "categorized by the government as a low-intermediate implementation" should have been more properly stated as "targeted by NCR to meet the low-intermediate level of implementation as specified by the Federal Information Processing Standards (Fips)."

In order to be "categorized" by the government, an individual or company must request formal validation from the Federal Cobol Compiler Testing Services for a specific Fips level of implementation (e.g., low-intermediate).

NCR has not yet requested such validation for the 8200 Cobol compiler.

J. Keith Lohmuller
Director, Eastern Division-Field Support
NCR Corp.
Dayton, Ohio

Issue Extraordinaire

I have always thought *Computerworld* was the greatest, but the April 25 issue was superb.

I would like to see more articles like "'Report Writer' Reduces Coding, Debugging Activitics" and "Syncsort or SM-1? Differences Difficult to Evaluate," in addition to other articles that are a definite aid to keeping the professional programmer informed.

Gabe Gargiulo
East Hartford, Conn.

All Lawsuits Important

The report on the Mt. Diablo School District trial in Concord, Calif. ["Mt. Diablo Awaiting Verdict on IBM 370," CW, April 25] attempted to put a perspective on how important IBM views the case. In this connection, the article stated "an IBM spokesman indicated the plaintiff's remedy of making the computer system sale null and void is unfair and inappropriate."

The fact is, we answered the questions this way: "In terms of dollars and cents, the remedy the plaintiff is looking for is that the computer sale be made null and void and IBM return whatever money it has received. IBM considers any lawsuit in which it is involved to be important."

When asked, "How important is a school board case compared to, for example, the Justice Department case?" our spokesman said, "We're not going to make that kind of comparison. We just feel that all lawsuits are important."

J.R. Young
Director of Communications
IBM
Armonk, New York

Problem Could Be Prevented

I would like to register some comments about "Seattle Bank 'Resolves' Operating System Conflicts" [CW, April 25].

First, the problem revolving around the bank's shared direct access storage device (DASD) environment should never have occurred. At IPL time, the systems programmer should institute automatic vary off-lines of all spindles known to be in possible use by the other operating system.

In addition, as IBM clearly stated, in a shared DASD environment, volumes should be indicated as reserved on both systems or reserved on one and off-line to the other. These are standard operating procedures in a shared DASD environment.

Harvey Karp
Ardsley, N.Y.

The Poetry of Programming

The following is a fragment found in a rolltop desk which I recently bought at the bankruptcy sale of a small software firm in Gnawbone, Ind.

The handwriting seems to be that of the Rev. Charles Dodgson, alias Lewis Carroll, who wrote *Alice's Adventures in Wonderland* and other treatises on mathematical logic. Chemical analysis dates the paper between 1870 and 1880.

This suggests that the controversy over structured programming is much older than was formerly thought.

The Coding of the Snark

He had drawn a large flowchart depicting the code
The development team were to write;
And the team were much pleased when they found it to be
A programming wizard's delight.
"What's the use of these CALLS, or the IF-THEN-ELSE clause,
Coefficients of binding, or DOs?"
So the team leader cried, and the members replied,
"GOTO goes wherever we choose!"
"This structuring stuff is pleasant enough,
But it takes all the fun from our jobs;
This flowchart's, we'll bet, the most challenging yet:
Just a tangle of arrows and blobs!"

Jonathan Sachs
Big Sur, Calif.

Standard Will Harm Innovation

(Continued from Page 30)

original manufacturer."

This statement promotes sinister visions of the big bad mainframe manufacturers conspiring to lock out the poor, innocent PCMs. It should be noted that Univac, IBM and probably other mainframers have policies which permit attachment of PCM devices at the user's risk.

The PCMs have not been locked out. The fact that they complain because the huge investment in design specifications is not given to them gratis on a silver platter is another matter.

The user who stays with the mainframe manufacturers for his complete system needs pays a little more, but is also guaranteed the integrity of the system. There is no divided responsibility when it comes to determining whether the data path errors are in the peripheral, I/O, channel, CPU or memory. The situation of one maintenance man blaming the other manufacturer's equipment is avoided.

Ford builds the whole car and sells it to the customer. You can't buy it without a Ford transmission, nor would it be a good idea to do so even if it were possible.

I hope CW readers will now understand some of the arguments against I/O interface standardization. The picture presented by the CCIA is a very unbalanced one.

Certainly the arguments for standardization in general are strong. But there are places where standardization is desirable and places where standards are bad.

The I/O interface is such a place. Far be it from me to argue against standardization — the Univac standards organization is one of my responsibilities.

Univac is recognized for its pioneering in the development of computer standards. The early work in standardizing higher level languages attests to our commitment to support standards that have a positive effect on the user, and we believe firmly in standardizing in the areas where it makes good sense to do so.

Lukoff is director of technical operations at Univac in Blue Bell, Pa.

More Products Reopen World of DOS Enhancements

● Eight Partitions Run With 'DOS/RS'

SCHILLER PARK, Ill. — Support for eight batch job partitions, two "special purpose" partitions and two subtasks are among the capabilities of Version 7 of DOS/Real Storage (DOS/RS), now available from Dearborn Computer Leasing Co., according to a spokesman.

That represents an increase of five batch partitions compared with DOS/RS Version 6, the spokesman said. It gives users of this operating system more flexibility than they would have under IBM's DOS/VS Release 34 or its companion Advanced Functions package [CW, May 9].

Flexibility comes from more than just the additional partitions, the spokesman noted. DOS/RS batch partitions are predefined, but may be reorganized dynamically into larger areas to accommodate big programs.

After the "problem" program is done, the partitions regain their individual sizes without any operator intervention, he said.

The "special purpose" partitions handle ongoing operations, such as spooling and teleprocessing.

The updated software also includes a Direct Access Storage Device Space Management feature. This provides dynamic allocations of space for new files and release of unused space at the end of processing on public volumes, the firm said. A data set catalog is also included.

To limit the space taken up by redundant coding in each partition, Version 7 has a Shared Access Method feature which provides a set of resident read-only shared I/O modules which can be used by any partition, the spokesman added.

An improved Scheduler has been built into the software, he continued.

This subsystem is responsible for the creation and later teardown of the multiple partition regions under which DOS/RS can handle large jobs without having to waste core on large partitions which are usually underutilized, the spokesman explained.

Facilities carried over from earlier versions of DOS/RS include support for IBM 3270 CRTs in place of 1052 typewriters as system consoles, for coupling two CPUs sharing a systems pack and other data files and for a generic ASSIGN facility.

Version 7 of DOS/RS is available under lease plans ranging from $700/mo for 12 months to $500/mo for 36 months. Dearborn is located at 4849 N. Scott St., Suite 401, Schiller Park, Ill. 60176.

● 'Grasp-Dox' Aids Console Use

BURLINGAME, Calif. — Grasp-DOX from Software Design, Inc. (SDI) is said to provide enhancements aimed at better utilization of a DOS or DOS/VS system's operator console.

It can be used as a stand-alone product or in conjunction with SDI's Grasp or GraspVS, according to a spokesman.

With the minimum configuration, all messages displayed on the operator's console are printed on the SYSLST printer at the end of job (EOJ).

This means each job has Syslog information on console messages printed along with the job control statements, and each message is time stamped for later reference, the spokesman noted.

The package also supports console spooling, deferred response and a "look-ahead-read" facility. The console spooling is similar to conventional spooling for printers and readers, he said, but it also allows the operator to defer responses to messages without "locking up" the console for jobs that need no response.

The "look-ahead-read," in effect, provides a capability that is the reverse of the deferred response. It allows the user to enter responses in anticipation of messages from the system, the spokesman indicated.

In what the vendor calls the most comprehensive feature of Grasp-DOX, the user is able to replace the IBM 1052 console typewriter with a 3277 CRT and a light pen attachment, if desired.

Seven CRTs can be locally attached to the system under this Grasp-DOX capability and three modes of display are available. One screen at a time is designated as the operator console screen; the others may be "console display" or "manager display" screen, the spokesman explained.

In operator console or console display mode, the CRT screen is split horizontally, with the top half displaying Syslog output and the most recent two lines of each partition. The bottom lines are reversed for operator replies and status information.

Each of the screens under this feature is independent of the others and can be frozen or rolled back without affecting system operations, he noted.

If the DOX features are added to a Grasp or Grasp VS system, the operator display screens can be used for job and data input.

The stand-alone Grasp-DOX costs from $140/mo, SDI said from 880 Mitten Road, Burlingame, Calif. 94010.

Users Facing New Decisions

By Don Leavitt
Of the CW Staff

To call the products on this page "responses to IBM's DOS/VS Release 34" [CW, May 9] suggests the vendors involved hadn't done anything in development until IBM made its announcements. It also suggests these products compete with IBM's offerings.

Both of these ideas are, in one sense, untrue and obviously unfair to the vendors; just as it was unfair to tag The Computer Software Co.'s Edos/VS [CW, May 16] as the first response to Release 34.

The fact is all of these products — and IBM's latest DOS/VS and its companion Advanced Functions package as well — have been taking shape for a long time. They go back, one way or another, to IBM's "functional stabilization" of DOS/360 with Release 26 in early 1972.

Even IBM recognized that wasn't the end of enhancements to its DOS: It just shifted the focus of its updates to the 370 environment.

The independent vendors — and many users — have obviously decided the 360 is still a pretty good piece of equipment. They've also determined there is no need to shift from an essentially DOS setting to gain many of the benefits of the much larger OS supervisor.

Up till now, however, these vendors have had a problem: They had to charge users for their software whereas IBM was giving away its updates of DOS.

IBM's DOS/VS Release 34 has little in the way of upgraded features compared with Release 33. But the company has made a whole collection of Advanced Functions available to the 370 user — for a price.

Ironically, then, it's not too far out of line to suggest IBM's announcements are responses to the reality of the market the independents have created, and not the other way around.

In any case, users now have a new environment; for any real enhancements to their operating system, they're going to have to pay someone.

● Itel 'Release 34' Ready in the Fall

SAN FRANCISCO — Itel Corp. is unbundling and upgrading the implementation of DOS/VS it has developed for users of IBM 360s and non-virtual 370s.

Acquisition of a mainframe or peripherals from the leasing company is no longer a prerequisite for getting the software that makes IBM DOS/VS-like facilities available on the older equipment, according to a spokesman.

Itel introduced its first non-virtual version of IBM's DOS/VS three years ago with a package that provided IBM Release 28 capabilities. Updates have generally kept pace with IBM's releases and the company expects to have its response to IBM's Release 34 [CW, May 9] ready in September.

Basic and Enhanced Features

Itel's basic DOS/VS includes support for five partitions, a relocating loader, a procedure library and variable partition priorities. It can handle multiple tasks, rotational position sensing (RPS) and supervisor selection at IPL time.

The company's separately priced DOS/VS Retrofit Enhancements and Maximization Services (Dreams) package extends the backing to include eight real partitions, partition balancing, extended use of 3277 CRTs in place of 1052 typewrites as consoles and dynamic device switching.

IBM's Advanced Functions package extending the mainframer's Release 34 — for virtual 370s only — supports partition balancing and the simple use of 3277s as consoles, but provides only six or seven virtual partitions and does not provide any dynamic device switching, Itel stated.

Itel's DOS/VS already has support for peripherals compatible with IBM's 3330 running on 360/40s, -50s and -65s, as well as on nonvirtual 370/155s. The company also has its 3330-11-compatible 7300-11 running on 360s, the spokesman noted.

IBM 3340s will run with Itel's "Release 33" on the nonvirtual 370/155 and backing for Itel's 7330-12 (IBM 3350-compatible) units will be available for 360/65s and 370/155s with the "Release 34" version in the fall, he said.

Prices for the basic DOS/VS start at $700/mo. The Dreams features are separately priced, but the entire package is available for an additional $275/mo, Itel said from One Embarcadero Center, San Francisco, Calif. 94111.

MMS GENERAL LEDGER quickly builds a solid financial reporting foundation.

Financial reporting systems from Software International are the most popular data base-oriented systems in the world. More than 1,000 leading corporations all over the globe have installed MMS systems.

Because it is designed from the ground up as a data base system, the MMS GENERAL LEDGER is at home in DOS, O/S, IMS, IDMS, DL/1 and even TOTAL. It is the perfect foundation for any of the other powerful financial reporting systems from Software International.

When you build your data base financial management system with the MMS GENERAL LEDGER, you get a rock-solid foundation, including basic and advanced education, thorough and tested documentation, and the experience of the Number One financial applications software company. Get the MMS GENERAL LEDGER and companion systems . . . only from Software International.

I am interested in your data base-oriented Financial Reporting System. Please send me more information about:

- MMS General Ledger
- MMS Accounts Payable
- MMS Accounts Receivable
- Net Change MRP
- Q-PAC PAYROLL
- FILETAB
- S/3 General Ledger
- S/3 Accounts Payable

Name _____ system _____
Title _____ Phone _____
Company _____
Address _____
City _____ State _____ Zip ____

SOFTWARE® INTERNATIONAL
Elm Square, Andover, Mass. 01810 (617) 475-5040
New York (914) 332-0040 Washington, D.C. (301) 770-6460
Philadelphia (302) 995-7101 Chicago (312) 729-7410
San Diego (714) 292-9833 Toronto (416) 862-0521 Dallas (214) 233-5656

CDC's 'Pallas' and Consulting Service Help Firms Work With Government

MINNEAPOLIS — Software designed to broaden the use of computer technology by law firms and corporations involved in civil or antitrust litigation has been installed on the Cybernet remote-computing network, according to the network vendor, Control Data Corp.

At the same time, CDC's Information Services has announced a consulting service to help business organizations use in-house systems to comply with the growing array of government regulations requiring extensive recordkeeping.

The Cybernet-based software, called Pallas, allows for the storage of complete texts of depositions, contracts, correspondence and similar documentation as well as statistical data, a spokesman explained.

It enables users, not necessarily trained in DP, to search large files by subject matter or data value to retrieve pertinent material quickly, he added.

Aids Regulation Compliance

The consulting service was intended to help computer users comply with the rules and regulations promulgated by such agencies as the Federal Trade Commission, the Equal Employment Opportunity Commission and the Environmental Protection Agency, the spokesman noted.

CDC has 50 full-time paralegal specialists — "augmented by part-time employees as needed" — to provide this support, he said. It is available on an hourly fee basis.

More information about Cybernet can be obtained from CDC, Box O, Minneapolis, Minn. 55440.

Cleveland Considers Capacity

CLEVELAND — Donald C. Harder, developer of the Capacity Curve for evaluating computer performance, will be the featured speaker at a computer measurement workshop sponsored by the Cleveland Engineering Society on June 16.

The day-long session will cover productivity and capacity definitions that apply regardless of the computer installed, Harder said. Attendees will have the opportunity to use the definitions in practice exercises.

Senior analysts with duties in capacity planning should benefit most, but those people concerned with "exploring, starting, funding or managing" a performance program would also gain from the seminar, a spokesman stated.

The registration fee of $185 includes lunch, he added. For more information, contact the society at 3100 Chester Ave., Cleveland, Ohio 44114.

Package Prints Console Record

FAIRFIELD, N.J. — The Logout package, now available from Macro4, Inc., was designed to permit IBM DOS and DOS/VS installations to tailor their console logs and to print all or parts of the logs on line printers at end-of-job (EOJ).

Logout accumulates console messages and responses in main memory and reproduces them for each partition on the printer at EOJ, the vendor explained.

The user may specify selective printing of the logs or define the tasks from which the logs are to be stored and printed, a spokesman added.

By moving log messages to the line printer, Logout is said to save user sites the cost of multiple-part console typewriter paper, to improve programmer productivity and to enhance service levels, especially to terminal users.

Multipart paper has traditionally been required so messages of value to personnel outside the operations area could be sent to them without destroying the basic log, the spokesman indicated.

With the EOJ printer output, users can print once on multipart paper or repeatedly on single-ply paper, if that is all that is available, the spokesman suggested.

The package costs $90/mo on a 12-month lease. It can be ordered from Macro4, Inc. at Gothic Plaza, 376 Hollywood, Fairfield, N.J. 07006. or from the company's offices in London, England.

FOR SALE
OR LEASE
EXPANDED
PDP11/03
type LSI11
SYSTEMS
- desk mounted system
- VT52 scope, LA180 printer
- 28K memory, all interfaces
- dual or quad floppies
- software

•10 MEG DISK
100 PLUS Corp.
701 Trinity St.
So. Plainfield, N.J. 07080
(201) 753-4460

HP's Terminals: smart, but simple.

With 10,000 sold in just two years, Hewlett-Packard's CRT line has made a considerable impact on the terminal market. The secret? Human engineering.

By designing our smart terminals around a microprocessor, we've managed to uncomplicate difficult jobs and make simple tasks a piece of cake.

But that was just the beginning. We wanted to make our terminals easy to maintain and expand. And we wanted to make them easy on the eyes, both from the operator's point of view and as pieces of office furniture.

We did it all. Our terminals won design awards for their appearance. And our exceptionally clear, high-resolution displays have won the hearts (and eyes) of everyone who has to spend long hours in front of a CRT.

Reducing operator fatigue.

For our screens, we use a 9x15 character cell, with dot shifting to provide exceptionally clear definition. You don't have to peer at tall, skinny letters. Ours look like the best typewriter printing, with the right spacing and descenders below the line.

By using white characters rather than green, we've made the display brighter and easier to read. (Have you ever tried watching black and green television?)

Several other screen features simplify an operator's life. Inverse video, optional half-brightness, underline or blinking characters can be used to stress important information, and reduce mistakes in transmission.

Plug-in modules for quick changes.

That's the simplest way of adapting a terminal to your job. So we offer a variety of components that pop in and out.

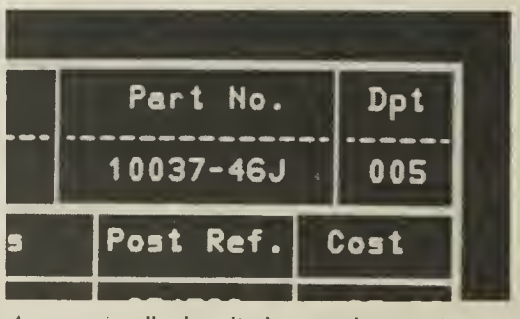
All our terminals have plug-in character sets to cover a wide range of computer languages. And a plug-in Forms Drawing option lets you generate almost any form your company uses.

Our smartest terminals let you plug in fully integrated mass storage. This takes the form of twin cartridges, each able to store up to 110,000 bytes of data or programs.

You can use this information locally (the terminal's "soft keys" save a lot of time and effort on off-line jobs) or transmit it to your central computer.

Another new terminal, the ultimate "have-it-your-way" design, should be extremely popular with OEMs. You can pick and choose from a variety of hardware modules, and write your own firmware. Everything plugs together for a virtually custom display station.

Some intelligent ideas for smart terminals:



An exceptionally clear display eases long sessions at the CRT. A Forms Mode aids accurate data entry.

Plug-in mass storage: you can get up to 110,000 bytes per cartridge.

The "soft keys" on our smartest terminals let you execute complex operations with a single keystroke and eliminate many repetitive jobs.

Problems? The self-test key helps pinpoint them for you

Measurement Series Extended

CHICAGO — Share, Inc., the IBM users group, has published Volume IV of its selected papers on computer measurement and evaluation (CME), covering the period of March 1976 to September 1976.

The 773-page book includes articles on virtual operating systems, mass storage devices, computer performance management and planning and forecasting, according to a spokesman.

Other subjects range from both software and hardware monitors through SMF and other accounting systems, he said.

A limited number of copies of Volume II and III, representing project publications from November 1971 to March 1975, are still available. Volume I, covering earlier writings, is out of stock and unavailable, the spokesman added.

Volume IV costs $25. Volume II and III contain a total of 1,580 pages and can be ordered for a discounted cost of $30 for the pair from Share, Inc., 111 E. Wacker Drive, Chicago, Ill. 60601.

With 'Ellipse'

1130 Software Runs on DG Gear

ROCKVILLE, Md. — The Eleven-Thirty Information Processing System (Ellipse) from Icon Corp. reportedly enables users of Data General Corp. Nova/-Eclipse hardware to use virtually any software that runs on IBM's 1130 processors.

The package allows DG disk-based systems to run IBM's Disk Monitor—Version 2 under Rdos, Mapped Rdos or the Advanced Operating System (AOS) "making the host computer bilingual," according to Icon.

With Ellipse in place, DG Ascii files are "completely interchangeable" with IBM Ebcdic files, a spokesman claimed. In addition, the 1130 devices are interchangeable with DG devices or logical files.

Current DG users contemplating a move from IBM 1130s can use a great deal of software, which has been thoroughly exercised and debugged, he noted.

Ellipse offers users access to language processors developed on the 1130, including Cobol, Fortran IV, RPG, APL, Cogo "and literally a thousand" application programs including ones for Pert charts, photocomposition, stress analysis and graphics, the spokesman said.

Business operations including accounts receivable and payable and inventory control are also available, he added.

The company maintains a large library of 1130 programs and a number of these are provided with the interfacing software.

Ellipse runs on any 32K or larger DG CPU, the spokesman said. The basic package costs $5,000.

Icon is at Suite 10 NE, 11300 Rockville Pike, Rockville, Md. 20852.

Data Bases Gain User Acceptance

PENNSAUKEN, N.J. — Commercial information banks—available on a number of remote-computer service networks—are back in favor "after nearly a decade of being overshadowed by in-house data bases", according to a study by Auerbach Publishers.

Users have recognized it is economically unrealistic to maintain specialized data bases of their own, especially if the bases are "multi-various collections of information that is outside the realm of standard business data," the study reported.

There are both passive and active information banks available, the study added.

"Passive" banks are large collections of information which a user can search for answers to questions made up of key words, while "active" banks act on the data and, in many cases, require input from the user for building in a formula or model, Auerbach explained.

Commercially available information banks can provide facts on agriculture, airplanes, banking, insurance, libraries, medicine, social science, technology and transportation, for a cost of pennies compared with the millions of dollars some companies have put into building and maintaining their own data banks.

Commercially Available Information Banks on the Rebound, discusses the cost factors which should be considered when subscribing to a commercial information bank.

It costs $15 from Auerbach at 6560 North Park Drive, Pennsauken, N.J. 08109.

Maintenance is a snap.

Unsnap a couple of catches and our terminal is wide open. The plug-in PC boards are right there. What could be easier for changing options or speeding up repairs by our servicemen?

Not that downtime is a problem. Our terminals have such a good MTBF that we've lowered our maintenance price twice in the past 18 months.

And when you do need service, you've come to the right company. We have more than 700 Customer Engineers ready to

give you support, documentation and training.

So when you're choosing a terminal, think of your people first. Then think of the terminals that are smart enough to be almost human. Your local Hewlett-Packard sales office can give you complete information. Or mail us the coupon and we'll send you the facts.

HEWLETT hp PACKARD

Smart doesn't have to mean complicated: eight HP terminals that prove the point.

The HP 2640B Interactive Display Terminal. Even our simplest terminal has many intelligent features, including an enhanced high-resolution display, plug-in character sets, dynamically allocated memory, microprocessor control, full editing, self-test, forms mode and more. It's a lot of terminal for the money.

The HP 2640C Cyrillic Display Terminal. This has everything you like about the B version, but it speaks Russian too.

Для *Cyrillic* Där *Swedish* سبة *Arabic*

The HP 2640N is fluent in Danish or Norwegian.

The HP 2645S completes our Scandinavian coverage with Swedish or Finnish.

The HP 2645R. Designed for an application in Iraq, this model enters Arabic characters from right to left. It also works from left to right for standard computer languages.

The HP 2645A Display Station. Our smartest terminal, it can transmit at rates up to 9600 baud, has a forms mode, user definable "soft keys," and optional fully integrated mass storage. A very intelligent choice.

The HP 2641A APL Display Station. This is modeled after the 2645A, but also includes a full 128 character APL set, plus an APL 64 character overstrike set.

The HP 2649A Mainframe Terminal. This data station is ideal for OEMs. It lets you design custom firmware for your special application and pick the hardware modules your system demands. Available with all of the 2645A's advanced features.

I want to know more about HP's terminals.
☐ Contact me to arrange a demonstration in my office.
☐ Let me know dates of the HP Terminals Seminar to be held in my area.
☐ Send me complete information about the following terminals:

Name_____
Company_____
City/State/Zip_____ Phone_____
Mail to: Ed Hayes, Hewlett-Packard, 11000 Wolfe Road, Dept. 303, Cupertino, CA 95014

42702HPT3

CASH for 3277's COMDISCO®
9701 W. HIGGINS RD.
ROSEMONT, ILL. 60018
(312) 698-3000

Move to Data Base Requires Changes in Philosophy

By Stephen L. Robinson
Special to Computerworld

Most DP people associate data base systems with revolutionary ways to store, retrieve and relate records. What is often not recognized is that a transition to the data base system philosophy of data organization requires a concomitant change in systems philosophy.

Data Base Corner

By systems philosophy, we mean the basic logic of application programs. Extended outward, since application programs reflect business system logic, we are talking about basic changes in the way organizations do business.

In order to understand the necessity for considering such revolutionary changes in business systems, we must consider the history of many contemporary DP systems.

Many years ago, when IBM was primarily a manufacturer of electronic accounting machines (EAM), many organizations made their first venture into automation. The "systems analysis" of such projects was done primarily by EAM experts, not business experts, thereby setting an unfortunate precedent which still plagues us today.

The EAM "systems" were, of course, mostly of the form shown in Figure 1. The print routines of such systems were typically of the form shown in Figure 2.

The fact that many existing business procedures did not conform to figures 1 and 2 did not deter the systems analysts. Since EAM was, after all, a new technology, the fledgling DP industry usually prevailed and new business systems and procedures evolved.

It should be noted that frequently the business people were quite unhappy with the new systems logic, but the "efficiency" of the new systems often carried the day.

With the advent of second-generation tape systems, it would have been possible to conduct new systems analyses. Since tapes were sequential devices, however, the easy way out was to simply employ the EAM system logic for the second generation of computer hardware.

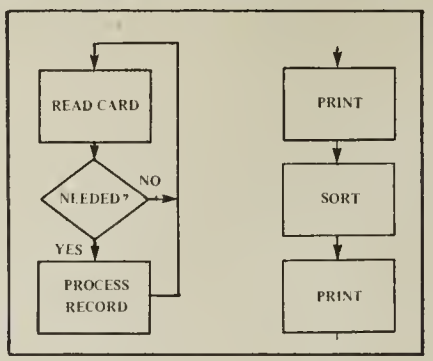


Figure 1

Figure 2

Third-generation hardware arrived, including wonderful random-access disks. Unfortunately (from a systems viewpoint), software and hardware support was provided to make third-generation hardware look like second-generation hardware.

With sequential access methods to make disks look like tapes and emulation to make IBM 360s look like 1401s, very little new systems analysis was done. Even new systems were not safe from archaic systems design.

Analysts and programmers, to an alarming degree, did not make the transition to the third generation; they were still designing and implementing second-generation (EAM) systems.

And so we march bravely forward into data base systems. But funny things are happening in this new world. Many data base packages, horror of horrors, do not support physically sequential files.

Oh, sure, they provide logical sequential processing (in which the records of a file, although not in physical sequence on a disk, can be retrieved in a logical sequence), but the inefficiency of such an approach for a large file can be quite substantial.

Some users of data base packages are spinning off files and sorting them. Their system and program logic end up being identical to the EAM logic displayed in figures 1 and 2. Indeed, it is rather interesting how many "data base systems" employ 80-character records.

What is clearly needed is a reintroduction of systems analysis procedures into DP projects. Such analysis should be done by two types of analysts:

- Business analysts, who are familiar with the functional requirements of an area being considered for data base development.
- Data base (computer) analysts, who are familiar with the capabilities and characteristics of computer hardware and peripherals, the data base package being employed by their organization and other available software (e.g., teleprocessing packages, data dictionaries, etc.).

Despite the temptation to do so, studying the overall logic of existing systems should be avoided during the assessment of the new system requirements.

It should be noted that a study of present systems is required in order to facilitate the transition process. However, this study should not initially impact the design of new systems. Later, transition logic may force a dual study.

Business analysts should be free to develop system logic that corresponds to the way the end users would like to operate, not the way they have been forced to operate by existing DP systems.

At the present time, the most advanced facet of the DP world is hardware. Software is lagging by a generation or less, but systems are lagging by two generations. It is up to the designers of data base systems to tighten the gap.

What do the biggest names in business have in common?

Cummins Key/disk and KeyScan® Systems.

The largest banks, insurance, retail and utility companies have found their dispersed processing solutions in Cummins Key/disk or KeyScan Systems — or both. The broad range of applications, from general data entry to high speed transaction balancing of payments, attests to the diversity and flexibility of the Cummins line.

Series 3400: With up to eight CRT/keystations, a line printer, disk and tape cartridge, a 3400 is ideally suited as a remote clustered data entry system, transmitting to a host and printing reports locally.

Series 4400: A 4400 supports up to 32 CRT/keystations and a variety of i/o devices resulting in virtually unlimited data capture capability. Front-end editing and validating routines significantly reduce dependency on mainframe.

Series 5400: Without peer as a dispersed processing system, a 5400 has a faster processor, greater storage capacity and supports remote terminals. It very often serves as the host in a network of systems.

Any of these Cummins Dispersed Processing Systems can be tailored to your specific requirements. No other vendor offers such a hardware and software combination. Peripherals include high-speed MICR/OCR reader-sorters, tag readers, terminal scanners, OCR wands and card readers.

If you'd like to improve your local or remote processing operations, do what so many big names are doing and check out the Cummins line of dispersed processing systems.

CUMMINS
CUMMINS-ALLISON CORP.
Data Systems Division
800 Waukegan Road, Glenview, IL 60025
312/724-8000

NTIS Book Outlines World of Standards

SPRINGFIELD, Va. — The second edition of *The World of EDP Standards*, now available from the National Technical Information Service (NTIS), describes the activities and the relationships of the many organizations and individuals involved at the national, regional and international levels in the development of standards for computers and information processing.

Written by Marjorie F. Hill and Josephine L. Walkowicz and published by the National Bureau of Standards, the 156-page book includes each organization's history, objectives, membership, structure, finances, relationships to other organizations and technical work.

Cataloged by NTIS as PB-263 771/8WC, the update of Hill's original book can be ordered in paper (for $6.75) or on microfiche (for $3) from the service at 5285 Port Royal Road, Springfield, Va. 22161.

Fill out and mail this self-addressed postcard.

☐ Please send me more information on:
☐ Have someone call me about:
☐ UCC ONE (Tape Management Software)
☐ UCC TWO (DUO, DOS under OS)
☐ UCC THREE/ADAM (Disk Management System)
☐ UCC SIX (PDS Space Management)
☐ UCC TEN (IMS Data Dictionary/Manager)
☐ UCC FIFTEEN (Restart/Recovery Management System)
☐ UCC FCS (General Ledger/Financial Control System)

Name _____

Title _____

Company _____

Address _____

City/State/Zip _____

Telephone _____

Hardware _____

UCC
UNIVERSITY COMPUTING COMPANY

First Class
Permit No. 13443
Dallas, Texas

BUSINESS REPLY MAIL

No postage necessary if mailed in United States

Postage will be paid by

UCC
UNIVERSITY COMPUTING COMPANY
Customer Relations
P.O. Box 47911
Dallas, TX 75247.

WE CAN HELP YOUR COMPUTER TO DO MORE OF THE WORK.

UCC software is solving problems in more than 1,500 installations. Worldwide. We can help your computer do more of the work, too. With software systems like:

TAPE MANAGEMENT: UCC ONE's 500 installations represent about ¾ of all installed OS tape management systems. UCC ONE manages your tapes and protects valuable data from loss or destruction. It provides real-time tape status. Eliminates costly, handwritten records and the expensive mistakes they breed. Gives you better control and greater efficiency.

DOS UNDER OS: UCC TWO lets you continue to use your DOS programs—without reprogramming—while you convert to OS. You plan the conversion or consolidation to fit your work schedule, instead of the other way around. You can consolidate your DOS operation into your OS/VS environment today. Or, you can spread the conversion—and the costs—over months. UCC TWO is the best path to OS and 500 users have proven it.

DISK MANAGEMENT: UCC THREE/ADAM solves the problem of inefficient DASD space usage. Based on user specifications, it automatically scratches unneeded, unused and invalid data sets. Or it will migrate the data sets to tape, based upon any combination of criteria—such as usage frequency, size and retention period. Then, UCC THREE keeps the problem from recurring by controlling data set allocation. Fragmentation and the need to periodically compress packs is reduced. Accurate reports on your current space utilization are produced.

PDS SPACE MANAGEMENT: UCC SIX is the only software package that eliminates PDS compression—because it automatically inventories and controls PDS disk space. It spells the end for ABENDS and "dump and restore" operations caused by exhausted PDS disk space. You even save money on your disk investment, too.

IMS DATA DICTIONARY/ MANAGER: UCC TEN is the standard IMS dictionary, with over twice as many installations as the Program Product offered by its nearest competitor. Not only does UCC TEN give you superior control over your data base environment, it also defines your data communication network, produces 3270 screen formats and generates IMS Stage I SYSGENS. Now, at last, you can get the benefits you expected from IMS.

RESTART/RECOVERY MANAGEMENT: UCC FIFTEEN lets you restart at the proper job step—instead of at the beginning. The OS catalog is corrected, unnecessary direct access data sets are deleted, and GDG biases are properly altered for the rerun. Automatically—so manual errors in restarting and rerunning are eliminated.

FINANCIAL SOFTWARE: The UCC General Ledger/Financial Control System is the most advanced and complete system of its type. Full general ledger accounting. Budgeting. Cost allocation and profit center reporting. It can generate over 100 standard reports. Plus, it has an easy-to-use report writer that the Accounting Department can use—with a minimum of EDP assistance.

SUPPORT: It takes more than code to make a good software product. It takes dependable, long-term maintenance and support of these products. And support is just one more way that we're helping the computer to do more of the work in more than 1,500 separate installations.

UCC

USA: P. O. Box 47911
Dallas, Texas 75247
Canada: 101 Duncan Mill Road
Don Mills, Ontario M3B 1Z3
Europe: 1258 London Road
London, U.K. SW16 4EG

CALL 1-(800) 527-3250 OR MAIL THIS CARD.

- ☐ Please send me more information on:
- ☐ Have someone call me about:
- ☐ UCC ONE (Tape Management Software)
- ☐ UCC TWO (DUO, DOS under OS)
- ☐ UCC THREE/ADAM (Disk Management System)
- ☐ UCC SIX (PDS Space Management)
- ☐ UCC TEN (IMS Data Dictionary/Manager)
- ☐ UCC FIFTEEN (Restart/Recovery Management System)
- ☐ UCC FCS (General Ledger/Financial Control System)

Name _____

Title _____

Company _____

Address _____

City/State/Zip _____

Telephone _____

Hardware _____

Customer Relations • University Computing Company
P. O. Box 47911 • Dallas, Texas 75247

CW-677

Member SIA Software Industry Association

Infoton has always produced a special breed of terminals.

Reliability is what has made seven generations of Infoton winners stand out from the field. And, like their predecessors, it's their reliability that makes the new Infoton 200 and 400 so very special.

They are just built better than other terminals in their class.

Take the 200, for example. A detachable keyboard of solid state construction guarantees 100 million operations . . . ten times the performance of most mechanical keyboards. And the keyboard comes in various configurations to suit users' unique requirements.

Other outstanding features include 96 character upper/lower case format, addressable cursor, EIA and current loop interfaces and non-destructive forward and back spacing.

The 400 has everything the 200 has . . . and more. Designed around the Z-80 microprocessor, it performs a multitude of functions. Capabilities include complete formating and editing with block mode transmission. Also character mode for normal log-in procedures or straight character operation.

Last but not least. Both the 200 and 400 have prices among the lowest in the industry. No wonder they are such favorites.

Write or call for full details.

Two new thoroughbred winners

Infoton

Second Avenue, Burlington, MA 01803
(617) 272-6660

See the new 200 and 400 at NCC – Booth 1787

For full facts, just contact any of the Infoton offices below:

- Brooklyn, NY (212) 838-8391
- Gaithersburg, MD (301) 840-9270
- Pasadena, CA (213) 796-9940
- Atlanta, GA (404) 455-0060
- Scottsdale, AZ (602) 994-5400
- Bellevue, WA (206) 454-9332

Integrates CCITT X.25 Protocol

Telenet Unveils Micro Concentrators for Packet Net

WASHINGTON, D.C. — Telenet Communications Corp. has unveiled a family of intelligent communications processors based on microcomputer technology for its public data packet network.

Several of the micro-based systems, called Telenet processors (TP), were designed to permit users computers and terminals to plug into the network without any hardware or software changes.

One of these processors will incorporate the CCITT's X.25 international packet switching protocol, according to a spokeswoman.

The specialized common carrier intends to incorporate the TP systems into the network itself as packet switches and data concentrators, pushing the network into a third-generation architecture, she explained.

The new architecture will result in improved cost performance and services and higher reliability than has been available in any previous packet network, the spokeswoman claimed.

Installation of the equipment within the network will begin this year and, by 1979, TP nodes are scheduled to be installed in more than 100 U.S. cities.

Two of the processors — the TP-1000 and TP-2000 — were planned for on-site customer use in the third quarter of 1977, the spokeswoman noted.

TP-1000 System

The TP-1000 is a host CPU and terminal interface processor interface to the Telenet public packet network.

As a host interface concentrator, TP-1000 was designed for the user who needs to support only a few asynchronous terminals simultaneously, but who wants the same error control and reliability available to large network users, the spokeswoman explained.

In remote locations where there are terminal clusters, the TP-1000 functions as a terminal interface concentrator.

In either situation; it is plug-compatible with Bell 103 or 113 series or equivalent modems and requires no software changes in the host computer, communications control unit or terminal devices connected to it, the spokeswoman claimed.

Telenet also designed the TP-1000 to operate for extended periods in an unmanned environment. Component modularity and single-card construction combine to minimize hardware failures and to permit unit replacements if a failure should occur the carrier claimed.

Telenet said it assumes all responsibility for installation, check out and maintenance of the equipment.

Firmware-controlled monitoring in the TP-1000 provides constant feedback to the network control center, the spokeswoman continued. This feedback reportedly acts as an early warning system for detecting potential malfunctions before they affect network service.

In addition, speed, code and parity can be either preset on a port-by-port basis under network software control or automatically set at the time a connection is established, she said.

Flow control logic is said to permit remote terminals and computer ports operating at dissimilar speeds to communicate without data loss.

Access to the Telenet network is provided over a full-duplex, 1,200- to 1,800 bit/sec network access channel. Alternatively, TP-1000s can be directly connected to one another via point-of-point private lines, she noted.

By using an error detection and correction algorithm, the TP-1000 assures virtually error-free transmission over the access channel to the network without throughput degradation on the low-speed

(Continued on Page 42)

Affect User's Business

Nets Must Be More Reliable: IBMer

By Esther Surden
Of the CW Staff

NEW HAVEN — In the communications system of the future, the user may not know if the data is being transmitted over lines or via a satellite, according to Ed Sussenguth, director of architecture and planning for IBM's System Communications Division.

Speaking on the topic of "where data communications is going" at a recent conference, here Sussengath said communications must become more reliable because it is beginning to affect the substance of a user's business — "the way the entrepreneur runs his business."

A teleprocessing system is complex because it is geographically dispersed by nature and synchronization between parts is very difficult, he explained. It is almost assumed that some part of the system will be down at any given time.

Networks are complex because "most users of systems don't just want to run in batch or interactive [modes] so you have to have programs that can work in all variety" of environments, he stressed.

Older systems also have to coexist with new systems, and there is a problem of complexity with the programs that run on the older systems. Communications handling is interwoven into the applications programming so, if the programmer wants to change a terminal type, for example, it is very difficult to do, he said.

"The key is to break the bond and keep the complexity down in the network handling part of the program," he said.

Other Problems

Problems other than just splitting the communications out of the program can be anticipated, Sussenguth continued. "Today the systems we know "think" about a byte as a unit that really means something."

"Soon we'll have equipment available that will transmit strings of data," he forecast. This kind of transmission will be many orders of magnitude different from byte transmission and will help industries like insurance in which the agent needs to look at a picture of the damage.

Noncoded data will be intermixed with the kind of data we use today, he added.

Another communications development involves the evolution of dumb devices into terminals with computers in them. Microcode will soon exist in what we used to, but no longer, think of as terminals, he said.

"That makes an enormous system difference" because now the user is performing system to system communications rather than communications from a DPU to a dumb electromechanical device.

Very tight control is needed between a host and an electromechanical device, but communications between computers can be program to program.

(Continued on Page 41)

Monitor System Works With IBM CPUs

GERMANTOWN, Md. — The Aspen Systems Corp. terminal monitor system is said to be a general-purpose communications monitoring system that implements and supports the operation of interactive applications between a variety of terminals and IBM 360 or 370 mainframes.

Aspens' system consists of two software modules designed to reside in the operating systems of IBM 360/40, 370/135 or larger IBM CPUs, according to a spokesman.

The terminal monitor provides a common application program interface between the operating system (OS/VS) and user-written programs, along with what is said to be an extensive on-line data management capability.

In combination, the terminal monitor services unit and the monitor command language can maintain line-image and structure data transactions and support source program library management, interactive processor management and process control device and application management, the spokesman said.

Software System

The software system operates in a dedicated or multiprogramming environment with services accessed by a 360 or 370 Supervisor Call routine. User-written programs can be in ANS Cobol, PL/1, Fortran or Assembler, he said.

Security for the system is reportedly provided by project identifier codes and passwords.

Features of the monitor, the spokesman noted, include terminal-to-terminal message switching, controls over editing and printout and a provision for remote job entry (RJE).

The RJE provision can be used to allow remote terminals to process data in a conventional RJE mode to activate a job stream which is processed in the mainframe operating system as though it were submitted in a standard RJE mode, he explained.

It adds "little additional overhead" to the CPU and can be activated at the user's choosing at no cost, he noted.

The data management component of the terminal monitor enables compression of 58% of

(Continued on Page 40)

modems

acoustic couplers

$147
☐ Series 150A
300 baud,31 models
For a variety of terminals

$245
☐ Series 302A
300 baud,19 models
EIA/20ma interfaces

hardwire

$245
☐ Series 302F,D
300 baud,13 models
Auto-answer option

rack mounted

cabinet $465
auto-answer modem $170
private line modem $150
☐ Series 330
Bell 133B replacement
Up to 16 modems

☐ 1200 baud ☐ 2400 baud ☐ 4800 baud ☐ 7200 baud ☐ 9600 baud ☐ Limited distance
Check items of interest and return this ad to us for more information.

ComData
8115 Monticello Skokie IL 60076
Tel. (312) 677-3900 TWX 910-223-3617
member of IDCMA

name _____
company _____
street _____
city _____ state _____ zip _____
telephone _____ ext. _____

Most Dominant Trend

On-Site Communications Seen Coming Soon

J. Roger Moody

By Ann Dooley
Of the CW Staff

NEW YORK — On-site communications systems will be the most dominant trend in the communications industry and this will occur within the next few years, according to J. Roger Moody, AT&T marketing director.

Until now there have been many on-site systems, each performing one specialized function such as security, communications or heating applications, Moody said.

A huge number and duplication of controllers, wires and terminals have amassed, but this method of operation is unlikely to continue for long, he noted.

"One controller must be used to handle all of this," he said. The same thing happened in the computer industry when one machine began to perform many functions. "Computer technology doesn't limit you," he noted.

A future advancement will be a communication processing language designed for the user so he can solve problems himself instead of waiting for the vendor to come up with a solution, Moody said.

All of these changes will be coming very soon, he predicted.

At one time, new communication products and services would take a long time from the concept stage to delivery. At Bell Systems, it would take 7-1/2 years, but "those days are ended," he added.

On-site communications systems will spread to home use, Moody forecast. Energy is quickly becoming one of the key issues and a system with a simple algorithm could determine peak usage times and regulate all home electrical devices, he said.

All systems whose messages must be sent to several points quickly and efficently could be linked to the same on-site system, he said.

On-site systems could also help increase office productivity, he added.

In Bell's first 100 years, Moody said, all the phone lines were tied together.

In the second 100 years, Bell's job will be to tie every different type of device together for completion of the message, he predicted.

Monitor Supports Unit Interaction

(Continued from Page 39)

original data without space reorganization. Disk space is immediately available for reuse if not explicitly saved, Aspen claimed.

The software system can handle any terminals compatible with Teletype Corp. devices, or IBM 3270, 2260, 2780, 3780 and 2741 terminals, the spokesman stated.

Transparent Communications

Transmission speed of any of those terminals is transparent to the monitoring system, he added.

The Aspen terminal monitor system is available on a permanent (25-year) license for $23,500. It can also be leased for one year for $885/mo, three years at $690/mo or rented on a month-to-month basis for $1,000, he said.

Aspen is located at 20010 Century Blvd., Germantown, Md. 20767.

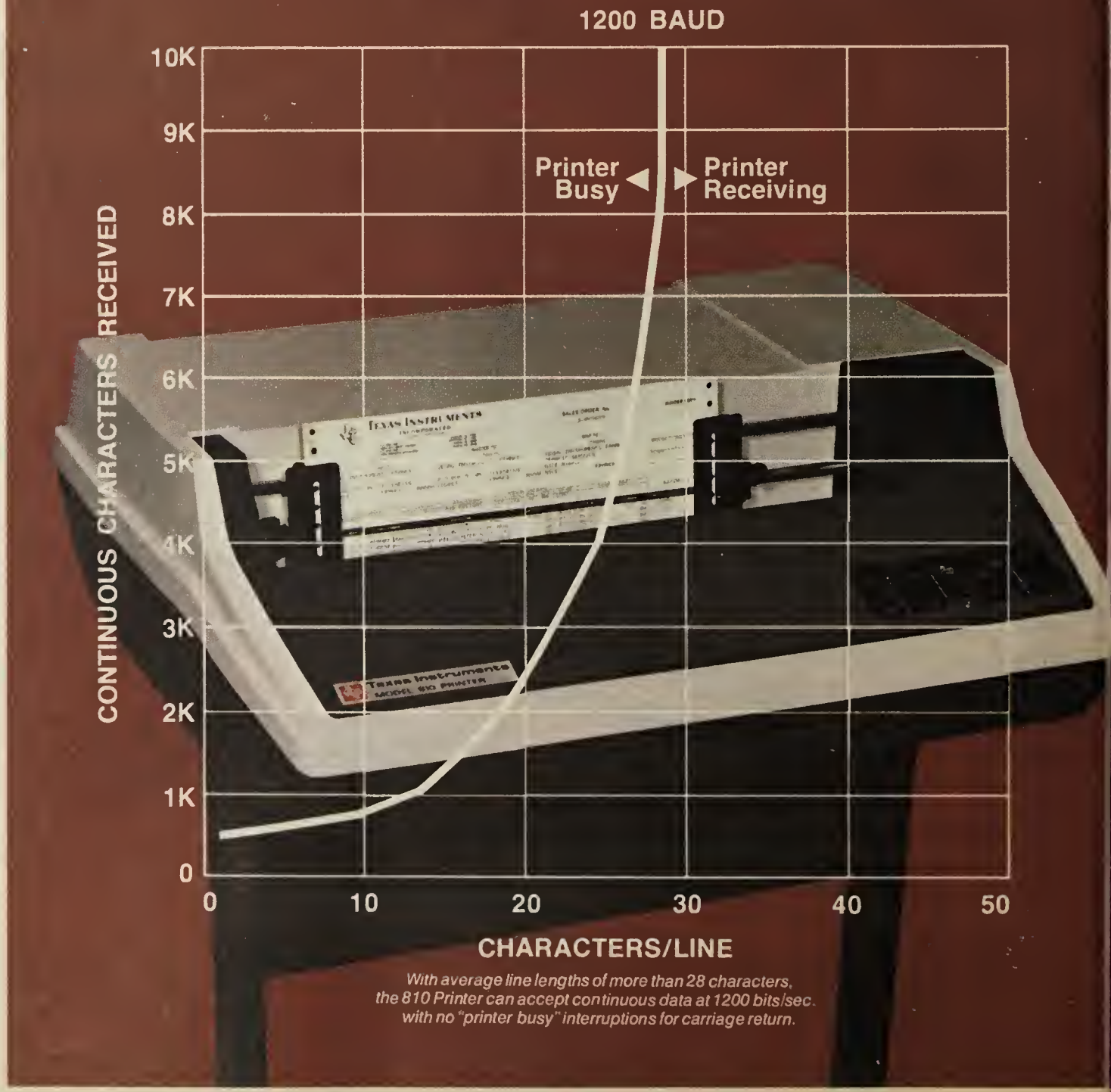
FOR SALE
Communication Terminals
- Teletypes - 28 32 33 35
- TWX - TELEX
- DECwriters LA36
- Acoustic Couplers & Hardwire Modems

DATA COMMUNICATION EQUIPMENT BROKERS, INC.
4915 Fernlee
Royal Oak, Mich. 48073
(313) 549-3400

FREE SOFTWARE
Why pay thousands of dollars for Payroll, Billing, Inventory, or Accounts Receivable software. Unlike other software cos. we don't believe in making all our profit off you! We have compiled a Library of Money making, Money saving! Advanced Business programs, all written in a language your computer will comprehend. BASIC. We also offer Games Eng, Stat, etc. For a little more than the price of the paper you could own tens of thousands of $$$ worth of powerful software. Vol. III Ad. Bus-$39.95. While they last. Add $2 for hndl. plus postage. (Includes: A/R, Inventory, Payroll, etc. software) CASH/CK/MO/MC/BAC * S.R.I. 1712 Farmington Ct., Crofton, Md. 21114 For phone orders call (800) 638-9194. Information & Maryland residents call: (301) 721-1148.

New from TI.

Plot the performance of the Model 810 Printer against any other printer on the market.



With average line lengths of more than 28 characters, the 810 Printer can accept continuous data at 1200 bits/sec. with no "printer busy" interruptions for carriage return.

T-Bar Expands Net Control Line With Diagnostic Devices

WILTON, Conn. — T-Bar, Inc. has expanded its network control product line with the TD-9, an intelligent diagnostic device for communications users.

The TD-9 comes with a CRT display and data trap. It acts as an interactive monitor, loop tester; as well as processor and terminal emulator, according to the firm.

In addition to the 16-line, 512-char. display capabilities of the monitor's CRT, the TD-9 comes with two user-specified programs to enable variations in the line discipline, code and format, a spokesman noted.

These programs are entered into the fixed memory of the terminal through the standard 128-char. keyboard, he said.

An integral data buffer permits the device to store up to 3,500 char., he added.

The instrument operates in asynchronous, isochronous or bisynchronous formats. It features programmable data rates from 50- to 9,600 bit/sec, in addition to both half- and full duplex capabilities.

Options for IBM Synchronous Data Link Control (SDLC) line disciplines are available. The SDLC capability will be expanded to include the CCITT's Higher-Level Data Link Control (HDLC), X3 and X.25 protocol standards, as well as the International Passenger Airlines Reservation System (Ipars) discipline, the spokesman added.

Mode Operations

Used in its loop text mode, the diagnostics terminal generates "fox" messages and random character messages for system- and self-tests, T-Bar said.

The processor emulator mode generates polls, provides timing of critical functions and performs error checking, whereas the terminal emulator mode allows the TD-9 to respond to polls and perform timing and error checking, the spokesman explained.

In the intelligent monitor mode, the device traps user-specified character sequences. The data trap can be used for selective storing or highlighting, the company noted.

Twelve LEDs indicate interface circuit activity, the spokesman stated, adding 25 pin jacks provide access to devices with an RS-232 interface.

The 24-lb diagnostic tool can also be configured as part of T-Bar's network control center equipment, the spokesman noted.

A carrying case is available to facilitate the TD-9's portability, he added.

The TD-9 costs $9,000 and includes the two line-format options. The carrying case costs an additional $175 and the SDLC option "will cost under $200," the spokesman noted.

T-Bar is located at 141 Danbury Road, Wilton, Conn. 06897.

Net Must Be More Reliable

(Continued from Page 39)

In addition, applications programming can now be done in the remote areas, giving more responsibility to the user. The types of data that can go back and forth between host and terminal are different so the users responsibility is enhanced, Sussenguth said.

But, with only certain types of data transmitted, system availability becomes key.

"Local processing is the only way to combat the system availability problem that exists when the telephone lines go down," he said.

In almost every major country, users can send data over networks devoted to local processing. The speeds accommodated by the networks are increasing, he said, so 4,800 bit/sec, 9,600 bit/sec and 56 kbit/sec speeds will be common soon.

In addition, more value added carriers will be available in the future. These services will provide code conversion, delayed delivery or closed customer groups, for example, he noted.

Satellite transmission will soon be a reality and it will provide certain benefits.

With a satellite, "you can broadcast information to all your subsidiaries at once." Satellites also provide the possibility of switchable band widths, he said.

Tariffs are becoming distance-insensitive, he noted. Because of this, the user will have to choose among all the options available and find the best combination.

Software complexity remains the biggest problem, but an international standard is being developed, Sussenguth said.

"But don't expect the standard to be your savior," he warned. "Such things are usually fuzzily written."

And you'll find our impact is exceptional.

TEXAS INSTRUMENTS.

Compare the new Model 810 Printer with any other printer you are using or considering. We believe you'll find that the 810's reliable, microprocessor-controlled printing results in the highest throughput per dollar and lowest cost of ownership.

The 810 is ideal not only for OEM's but as a peripheral printer for the TI model 770 Intelligent Terminal and the 990 Mini/Micro Computer Family.

Plot our standard features. The 810 printer has exceptional standard features too. Like bi-directional printing at 150 cps. No paper tape programming. Adjustable tractors for a variety of form widths. A 9 X 7 wire matrix character font for high-quality printing of an original and 5 copies. Bottom and rear paper loading. Speeds from 110 to 9600 baud. And 6 or 8 vertical lines per inch. Add to these the 810's tested reliability and the result is *performance*.

Add a full line of options. With Vertical Forms Control, you get non-volatile storage of up to 8 different vertical forms. And with Forms Length Control, you can have 11 switch-selectable stored form lengths, from 3 to 14 inches plus 1 programmable form. The compressed printing option lets you print 132 columns in 8½ inch width. And foreign character sets are available as well as interfaces for most applications.

A company you can rely on. A valuable feature of any Texas Instruments product is after-sale support. When you purchase your 810 Printer, you're getting support from a world-wide network of factory-trained personnel. And contracts are available for up to 24-hour, seven-days-per-week service.

With the Model 810, you can be sure your total cost of ownership is the lowest possible. And printer performance the highest. For a demonstration of the Model 810, or more information, just mail the coupon. Or call your nearest TI sales office, or (713)494-5115, ext.2124.

You'll like the 810's impact.

Yes! I am interested in the new Model 810 Printer. 9-6-CW
☐ Please send me more information.
☐ Please have your representative call me.
Name_____
Title_____
Company_____
Address_____
City_____ State_____ Zip_____
Phone_____
Mail to:
Texas Instruments P. O. Box 1444, M/S 784 Houston, Texas 77001

©1977, Texas Instruments Incorporated

TEXAS INSTRUMENTS
INCORPORATED

See Texas Instruments products at Computer Caravan and NCC.

MAGNETIC TAPE SALE

Slightly used, Money-Back Guarantee
U.S. Government Archives
Manufactured to G.S.A. Specs!

2400' 1600'bpi/3200 fci
w/Hanging Seal $4.50 ea.

1200' 1600'bpi/3200 fci
w/Hanging Seal $3.50 ea.

Freight pre-paid on orders over 200
Tapes Shipped within 48 Hrs
Call or Write

Computer Tape Mart
1975 Hempstead Turnpike
East Meadow, NY 11554
[516] 794-9195
(Brokers Inquiries Welcomed)

IBM Users Get Gamma Display System

PALO ALTO, Calif. — The GT-70 telecommunications display system from Gamma Technology was designed for IBM system users who want 3270 emulation and the opportunity for upgrading to distributed processing.

Up to 32 IBM 3271- and 3275-compatible CRT terminals can be attached to the company's GT-70 system, a spokesman stated.

The communications system software utilizes IBM's binary synchronous communications (BSC) line discipline for transmission at speeds up to 9,600 bit/sec, Gamma noted.

Data General Corp. minicomputers comprise the system hardware. A typical configuration includes a DG Nova or Eclipse CPU serving terminals with any mix of display speeds from 300- to 9,600 bit/sec and printers operating from 30 char./sec to 600 line/min, the company said.

The GT-70 program can be configured to run under standalone, mapped or unmapped disk-based systems. In the mapped configuration, a second user partition is available to permit simultaneous foreground and background operation, according to Gamma.

When not used in 3271 applications, the GT-70 is said to be a general-purpose system capable of supporting multiterminal editing, multiterminal Basic or other user-written applications.

The system price ranges from $32,000 to $93,000 depending on the number of CRTs, CPU size and I/O devices desired, Gamma said from 800 Welch Road, Palo Alto, Calif. 94304.

Telenet Unveils Micros For Network User Sites

(Continued from Page 39)

asynchronous ports, she stated.

The TP-2000 series was designed as a host interface processor for users with a requirement to simultaneously support 12 to 32 asynchronous terminals.

Telenet said it is plug-compatible with Bell 103, 113 or 202 series or equivalent modems and is designed to require no software changes in the host computer or communications control unit.

Telenet also designed the TP-2000 to operate for extended periods in an unmanned environment.

A high degree of availability and reliability is obtained from its component modularity, dual-bus architecture, parity protection on all memory and busses, independent line processing units with dedicated microprocessors and memory and centralized monitoring and diagnostic firmware, the spokeswoman claimed.

Dual access lines to the network are also supported, she added.

The TP-2000 can be configured as the TP-2000R, a redundant unit with dual memory, line processing units and power supplies, she said.

The flow control feature enables asynchronous ports at the host end to operate at 1,200 bit/sec while terminals at the remote end operate at any speed from 75- to 1,200 bit/sec to attain rapid network response time and eliminate multiple rotaries, she added.

X.25 Network Access

Access to the Telenet central office is provided over a 2,400- to 9,600 bit/sec full-duplex circuit, using the CCITT X.25 packet-switching protocol to promote error-free transmission of all data, according to the firm.

The TP-2000 allocates circuit bandwidth based upon actual traffic, which reportedly permits the processor to support more terminals without an increase in circuit capacity.

Typically, the device can support 2 to 2.5 times the number of terminals on a circuit than can a conventional multiplexer, Telenet claimed.

Like its TP-1000 counterpart, firmware controlled monitoring in the TP-2000 provides constant feedback to the network control center.

The TP-2000R will be available for users in the fourth quarter of this year, the company added.

A TP-1000 with three ports costs $6,000 to purchase, $200/mo to rent and $200 to install. The processor's access port for the Telenet central office costs $150/mo and an additional $350 to install, the spokeswoman said.

A TP-2000 with 12 ports costs $23,000 to purchase, $770/mo to rent and $600 to install. Its central office access port costs $300/mo and $400 to install, she stated.

Four additional TP-2000 asynchronous ports are scheduled to costs $2,400 or $80/mo, while its installation will cost an additional $100, if not done at the time when the basic unit is installed.

The TP-2000R with 16 active and 8 standby ports costs $51,000 to purchase or $1,700/mo to rent; installation costs $1,000.

Eight additional ports costs $4,800 or $160/mo and the processor's access port can be rented for $300/mo and installed for $400.

Rotary feature options for all three processors cost $50 to install and $20/mo. Other options for all three include a private network feature. Answer-only modems are available for the TP-1000.

Telenet is located at 1050 17th St., N.W. Washington, D.C. 20036.

Bits & Pieces

ISI Introduces Fiche Option For Data Storage, Retrieval

CULVER CITY, Calif. — Image Systems, Inc. (ISI) has unveiled its ISI 5000 computer-controlled automated fiche retrieval and display system.

A "receive-only" peripheral, the ISI 5000 can be used with any interactive terminal to combine microfiche storage and computer retrieval of large amounts of alphanumeric and/or graphic data, the firm said.

The unit contains up to 180,000 fiche pages of information, any one of which may be computer selected and displayed in 3 sec on an 11-in. by 14-in. screen, according to a spokesman.

A fully loaded system can make over 1G char. available for on-line display to an operator, the equivalent of 30 40M-byte disk drives, the spokesman claimed.

The interface was designed for bit serial information. The interface can be equipped for either RS-232C or current loop I/O signals. Transmission rates from 75- through 9,600 are field selectable, he added.

The unit costs $8,800 from the firm at 11244 Playa Court, Culver City, Calif. 90230.

HI Offers Plotter Controller For Use With CDC Cyber

AUSTIN, Texas — Houston Instruments (HI) has introduced the Complot BTC-7/734 plotter controller for use with the Control Data Corp. Cyber 18-5 remote batch terminal.

The controller was originally designed to interface between the CDC 734 and Complot digital plotters and is now applicable to the Cyber 18-5 for graphic plotting, according to the firm.

The system adapts to standard Cyber 18-5 controller and Controlware equipment, does automatic plotting at speeds up to 4.5 in./sec and can be installed in less than an hour with no modifications, the firm said.

The plotter controller costs $2,595 from HI at One Houston Square, Austin, Texas 78753.

Line Voltage Protection System Reduces Line Noise

BINGHAMTON, N.Y. — A solid-state line voltage isolation and protection system that reportedly reduces line noise and offers protection against transients is available from Control Concepts Corp.

Islatrol units feature input ranges from 105 through 408 volts RMS, with from 50-Hz to 400-Hz frequency. Standard units operate at 1-, 2.5-, 7.5-, 15- and 30A.

Prices start at $24.25 from the firm at 333 Front St., Binghamton, N.Y. 13905.

A 'Tug-of-War' Decision

COM: In-House or Out? Factors Outlined

DALLAS — Users trying to decide whether to establish an in-house computer-output microfilm (COM) system or to retain a service organization must consider at least eight factors, according to James W. Lewis.

Lewis, vice-president of branch operations for U.S. Datacorp, a COM service company based in Portland, Ore., told attendees of the annual convention of the National Micrographics Association here that volume and cost have been the traditional criteria in making the decision.

However, he added, COM users also need to analyze their organization's geographic location vis-a-vis available vendors, management philosophy, turnaround needs, technical knowledge of COM, vendor capabilities and data security needs.

"The in-house or service decision is often a tug-of-war," Lewis said, noting that neither alternative is always right for every organization. He urged COM users to evaluate their particular situation, based on these criteria, and to choose accordingly.

Magical Figure Myth

The existence of a magical volume figure at which in-house systems become more economical than service bureaus was dispelled as a myth by Lewis. Volume is a factor at the two extremes of the spectrum, he pointed out.

"An organization needing fewer than 100,000 frames of COM a month could probably not afford to go in-house. On the other hand," he said, "it would be very unlikely that an organization requiring more than a million frames a month would still be on service."

Most COM users fall between these two extremes and this is where other considerations become more important, Lewis indicated.

Companies tend to go in-house with lower volumes if they are located in outlying areas where high equipment costs are offset by higher costs for distribution and delivery. In bigger cities, where multiple service and hardware vendors are located, companies do not usually go in-house until they reach higher volumes, he said.

Many companies take a "we'll do it ourselves" approach to services like COM, in which case an in-house capability might be more desirable.

However, many companies see COM as an incidental aspect of their total operation and are quite satisfied to let someone else handle the problems attendant with running a COM production facility, he said.

A major measure of user satisfaction with COM lies in the time that elapses from when a tape is available for processing until it is in the user's hands. Users need to determine what turnaround time is required, and to test whether a service bureau can deliver on time.

They shouldn't assume that an in-house system is necessarily quicker, Lewis cautioned. Internal departments can miss deadlines with COM just as they can miss daily turnaround on paper reports.

The volume and the size of the application can be crucial to on-time delivery, Lewis noted. A large number of small jobs with tight turnaround may be best handled by an in-house system. However, if time is not crucial or if jobs are only run on a weekly or monthly basis, service might be more practical, he said.

Knowledge of COM

Probably the most important consideration is the organization's knowledge of COM, Lewis continued.

"Have you determined the best applications, reduction ratios, indexing capabilities and storage retrieval devices for your organization's individual needs?" he asked his audience. "Even more important, have you found out whether COM will be accepted in your company?

"A good way to learn," he suggested, "is to start with COM on a service basis."

Highly competitive industries where security of data is important may desire to go in-house — even if their volume is low and the per-fiche cost is high. Even if security is not critical, COM users should investigate a prospective service bureau's screening and bonding procedures, plus their I/O controls to eliminate any security problems, he advised.

In evaluating a prospective COM service bureau, user should check the reputation of the firm, the performance on deliveries, quality of work and the firm's financial strength.

Other factors included are the company's involvement in research and development and user education, indexing capabilities and the ability to come up with products and services that will allow the users to take advantage of the most recent opportunities in the COM field, he said.

Know the Hidden Costs

Finally, Lewis warned prospective COM users to become familiar with the hidden, as well as obvious, costs of in-house systems. One-time charges that occur in either a service or in-house situation may include software, systems changes and forms slides.

Some service bureaus charge a fixed price for each original frame or a fixed price for each fiche; others charge for each copy frame or each copy fiche, he indicated.

In-house COM costs are often more difficult to determine, according to Lewis. Prospective COM users too often rely on vendors to come up with in-house COM cost estimates.

While hardware suppliers can provide figures on maintenance, lease and rental costs, they tend to minimize the costs for "people, reruns and redundancy," he said.

Personnel, consumables, space and management can represent up to 60% or 75% of an organization's total in-house costs, Lewis estimated. Yet, he noted, these are the very areas that organizations often refuse to acknowledge when planning their installations.

(Continued on Page 48)

Five COM-Related Products Bow

DALLAS — Datagraphix, Inc. introduced five products related to the computer output microfilm (COM) market at the National Micrographics Association exhibition here recently.

The firm unveiled a dual 1,600/6,250 bit/in. tape drive, a 48M-bit four-surface disk drive for the firm's 4550 and 4560 COM recorders, a full-reversal module and a diazo duplicator for its Autocom recorder/processor and a microfiche reader.

The 1,600/6,250 bit/in. read/write tape drive offers automatic tape loading and reportedly increases throughput and reduces operating steps. Error detection and correction capabilities are included on the 6,250 bit/in. drive, the firm said.

The unit's formatter/controller can manage up to four drives. The drive is available as a factory order for $39,000 or as a field upgrade.

The 48M-bit four-surface disk drive was designed for random access requirements, the firm said. It utilizes one fixed and one IBM 5440-type removable cartridge and costs $20,000.

The full-reversal module for the Autocom recorder/processor automatically reverses film polarity and produces cut, dry, negative-appearing microfiche in the format required for diazo duplication, the firm said. The module costs $2,900.

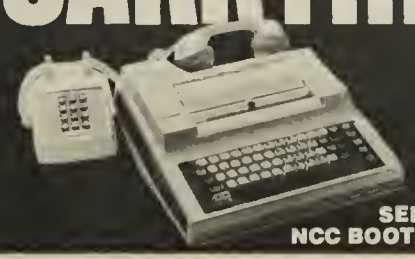
The Model 72 duplicator was designed for use with the full-reversal Autocom to produce Diazo microfiche in medium-volume COM operations, the firm explained. The unit produces up to 400 cut diazo microfiche per hour and costs $11,800.

The Datamate 100 reader displays full-size images of source document or COM microfiche on an 11-in. by 14-in. screen. It provides 24-, 42- or 48-power magnification and costs $229.

Datagraphix can be reached at P.O. Box 82449, San Diego, Calif. 92138.

NOW, DDI MAKES TI'S 745 EVEN EASIER TO CARRY... ONLY $89 PER MONTH*

*12-month, quantity rental price, including TI maintenance.



SEE US IN NCC BOOTH 1587

Branch offices: New York City • Morris Plains, N.J. • Philadelphia (Cherry Hill, N.J.) • Washington, D.C. • Atlanta • Detroit (Southfield) • Los Angeles (Encino) • Houston • San Francisco

NEED A TI 745 or 743—FAST?
Call DDI—we have them in stock!

Favorable pricing and fast delivery are just two reasons DDI is America's leading supplier of data communications equipment. With DDI you have:

- A single source for DEC, TI, ADDS, DIABLO, OMNITEC, TECHTRAN.
- Full range of new products.
- Choice of rent/lease/buy plans.
- Unique Combination Savings Plan.
- Nationwide maintenance service.
- Nationwide branch network for prompt response to your needs.

Data Dimensions, Inc.

51 Weaver St., Greenwich, Ct. 06830
TEL: (203) 661-1700

Exploring DDP – Part 3

CPU Compatibility Stressed for Successful DDP Net

By Richard Weber
Special to Computerworld

Hardware for the distributed data processing (DDP) network should be supplied by a single vendor and must be available in a range of sizes. This will allow a processor to be configured to exact department requirements and permit the small department as well as the large one to justify a node.

In the absence of small configurations, that department must time-share with a larger department. Similarly, a good upward growth path will assure that anticipated larger applications can be covered.

It is essential that all processors can use the same peripheral devices — that they can be interchanged and thus be accessible to each node in the ring. All processors in the ring must be compatible so they can run one another's programs and back each other up.

Applications are assigned priorities so a small processor does not back up a larger one, although it could take over a subset of critical activities.

The processors in the ring are tied with one of four types of communications links: parallel links, serial links, standard communications links or shared-memory mechanisms. All activities between processors occur over the links.

Like the hardware, operating system software must be configurable to smaller subsets so every application can justify itself as an official node. It must also be compatible so critical application programs can be taken over by another processor in the ring.

In a DDP network, it is essential that a full range of operating system and complementary software is available. It is important to have multiprogramming capability to allow multiple users to access the system without contention.

This is particularly important for a program development processor because it will let a number of application programmers run, test and debug their code concurrently. There should be a full set of program and development tools, including debuggers, text editors, diagnostics and loaders.

Finally, there should be a complete set of languages, such as Cobol and RPG for batch-oriented business applications, Fortran for scientific applications and Basic for time-sharing and engineering applications.

In a loosely coupled configuration, node functions are assigned in the same way as in the ring, but hardware and software requirements are more flexible.

Software support needed for communications among the processors in the ring will vary with the distance between the nodes. If the nodes are side by side, one can be designated to handle all communication functions and thus carry the bulk of communications software overhead.

This is the final article in a three-part series on centralized vs. decentralized processing by Richard Weber, vice-president of sales for Data General Corp. This series is extracted from a presentation given at the 21st University of Alabama DP Conference held in Birmingham, Ala., earlier this year.

This week Weber examines the hardware, software and communications requirements for a distributed data processing network and shows how two firms approached the subject of meeting diversified processing needs.

A communications access software package routes data around the ring as specified by other processors' application program. The application program only indicates the designation.

In rings that are geographically spread out, each node will have to have its own communication subsystem, hardware and software. In both forms, communications software should reside in operating system space, not in the user's space.

Structuring Data

There are several methods of distributing files or data bases in DDP networks. One is to have a common data base accessed by all processors in the ring; another is to give each processor a copy of the common data base; still another is to give each processor its own individual data base for its assigned application.

The most effective way to structure data in a ring network is the latter, which distributes the data base as well as the processors and therefore comes closer to true distributed processing because each application has data base resources dedicated to it and the data flow matches the processing flow.

I think what quickly becomes evident in these various hardware and software design considerations is that the user becomes somewhat more self-sufficient than he has been in the past. He relies less on his vendor.

Satellite Processing

One other kind of DDP is called satellite distributed processing. This is an independent, self-sufficient processor apart from the host. The satellite system may be an end in itself, or it can be the first critical step to total decentralization.

From the DP manager's point of view, a satellite familiarizes the organization with the concept, techniques, problems and implementation of DDP before the entire DP load is converted. It is a low-risk, highly educational and foresightful approach.

An experimental test of the benefits and suitability of satellite (and eventually totally decentralized) processing starts with a single, dedicated application that is well defined and bounded. The application should be one that is problematic on the host mainframe because of cost, throughput, response time, overhead, real-time or interactive requirements.

Removing this application from the host often means preventing an imminent upgrade. Alternatively, the application can be a new one that would pose the same upgrade and conversion problem.

Herein lies the cost justification as well as the advantages of dedicating a processor to an application. These advantages include better response time, up-to-date and immediately accessible data, easy resource and cost allocation and higher system reliability

(Continued on Page 47)

Now there's an alternative to the high cost of mainframe disc storage. DIVA's Computroller V.

If you've decided to buy your minicomputer system from DEC, DG or Interdata, you already know the facts about their disc storage systems. They're well designed. They're also expensive.

Now, you can get the same high performance, reliability and software transparency of the mainframe product at a price that makes sense. With Diva's Computroller V line of disc systems.

The Computroller V matches the mainframer's system feature-for-feature, but costs up to 50 per cent less to purchase, install and maintain. With no shortcuts in design or service support.

The reason? Unlike the mainframer, we specialize in the development of disc storage systems to help you cope with the continuous expansion in information processing. The Computroller V has an amazing capacity range of 25-300 megabytes per spindle. Plus compatibility with the mainframe system and total software transparency.

No other disc storage system can interface, adapt and self-test like the Computroller V. Make your own comparison and see how the Computroller stacks up against other mainframe products.

	DIVA Computroller V	Mainframer
Complete Software Transparency	YES	YES
ECC Error Correction	YES	YES
Complete Customer Services	YES	YES
Resident Self-Checking Diagnostics	YES	YES
Microprocessor Technology	YES	YES
Dual Processor Support	YES	YES
Interface to Most 3330 Technology Drives	YES	NO

From now on, this may be the only system your company will need for mass storage. For more information, fill in the coupon or call Toll-Free at 800-631-2141.

DIVA, Inc./ Dept. C / 607 Industrial Way West/ Eatontown, New Jersey 07724

NAME POSITION

COMPANY TELEPHONE

ADDRESS CITY

STATE ZIP CPU

ITEL'S ADVANCED SYSTEM.™ THE SENSIBLE ALTERNATIVE.

As a matter of fact, it's the only sensible alternative to the IBM-370. Because Itel's Advanced System not only gives you everything its IBM counterpart does (in some cases, even more), but gives it to you at enormous savings.

Dramatic advances in the semiconductor industry have allowed us to build a more reliable, more powerful CPU using about half the components IBM uses. Which means our Advanced System runs approximately 9 degrees cooler, increasing the reliability of its integrated circuits.

And the Advanced System comes complete (including a 180 cps printer, not shown). No optional "special features" that often cost you almost as much as the system itself.

To prevent obsolescence (and protect your investment), all of our six Advanced System models can be either upgraded or downgraded–as the situation demands.

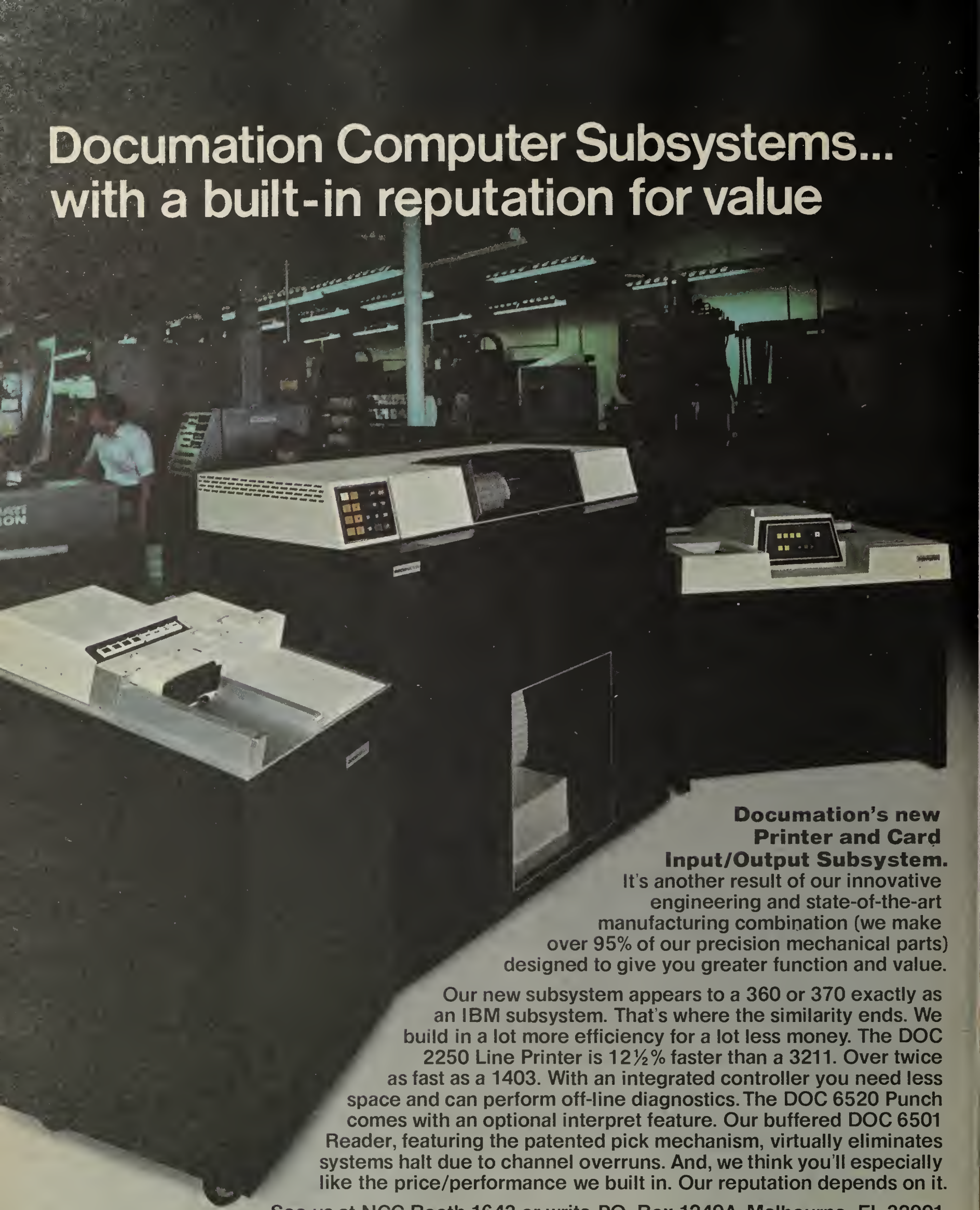
We put our best efforts into providing sensible alternatives. Not only in total computer capability. But in systems and software. In computer peripherals. In field engineering. In financial packaging.

When it comes to experience and reputation, it's either us or IBM. But when it comes to price/performance, there's only our Advanced System.

Itel. The only sensible alternative.

ITEL
CORPORATION
Data Products Group
One Embarcadero Center
San Francisco, California 94111
Telephone: (415) 983-0000

Documation Computer Subsystems... with a built-in reputation for value



Documation's new Printer and Card Input/Output Subsystem.
It's another result of our innovative engineering and state-of-the-art manufacturing combination (we make over 95% of our precision mechanical parts) designed to give you greater function and value.

Our new subsystem appears to a 360 or 370 exactly as an IBM subsystem. That's where the similarity ends. We build in a lot more efficiency for a lot less money. The DOC 2250 Line Printer is 12½% faster than a 3211. Over twice as fast as a 1403. With an integrated controller you need less space and can perform off-line diagnostics. The DOC 6520 Punch comes with an optional interpret feature. Our buffered DOC 6501 Reader, featuring the patented pick mechanism, virtually eliminates systems halt due to channel overruns. And, we think you'll especially like the price/performance we built in. Our reputation depends on it.

See us at NCC Booth 1643 or write P.O. Box 1240A, Melbourne, FL 32901.

DOCUMATION
INCORPORATED

CPU Compatibility One Factor Essential for DDP Net Success

(Continued from Page 44)

and availability.

An example of using DDP is shown in the way two different companies have set up networks in two different ways.

The first is a large North American heavy equipment dealership. The company carries a $15 million parts inventory of about 250,000 line items. It has 25 geographically remote parts operations, each of which maintains its own inventory (parts stock may vary from one to the other). The company's previous DP equipment was a large batch system.

The company installed two Data General Eclipse C/300 small systems at its headquarters. These act as the central system for a real-time interactive network of intelligent terminal systems located in the remote operations.

The intelligent terminal systems consist of a DG Nova 3 minicomputer with two or more CRT displays and one or more line printers. Each terminal system is connected to the central Eclipse system by dedicated, synchronous lines.

The network gives each remote operation immediate on-line access to inventory data stored on the central system. If a local operation does not have a part in stock, it can query the data base to see which locations do.

This lets the parts person compile a complete purchase order line by line, no matter where the parts are actually located.

The system also handles order processing. Once the purchase order is completed, the central system removes the parts from inventory and cuts an internal shipping order. In addition, the network handles interoffice communications, replacing TWX and Telex.

This network approach to DP is speeding up order processing. It has also improved inventory control, reduced total inventory and lowered communications costs among the various remote operations.

The second example illustrates a different approach. The user is a holding company of electrical and plumbing supplies distributors. There are 14 subsidiaries located in several different states.

Each subsidiary operates autonomously and has its own profit and loss statement. Consolidation is done at year-end.

The holding company and the subsidiaries had limited DP capabilities ranging from manual methods to small IBM System 3s. The holding company itself had a batch 3/10.

The company determined it needed an on-line order entry and purchasing system for itself and its subsidiaries. The previous vendor first suggested an upgrade and the addition of remote job entry terminals. It later recommended an IBM 370/135.

The user rejected these proposals and elected to look for an alternative. For company headquarters, it chose a DG Nova 3 system with a 10M-byte disk, CRTs and line printer for its own operations.

Each of the subsidiaries has a similar configuration and uses similar software. Once a week, the subsidiaries transmit summary information to headquarters over dial-up lines, off-line, all night.

All the systems handle the same basic functions — accounts receivable and payable, general ledger, local payrolls and local inventory management. Inventory information is stored in the local data base; users have on-line, interactive, multikeyed access to the data.

This DDP scheme provides each operation with total DP support. It allows each to manage its inventory more effectively and permits immediate on-line access to the inventory data.

In addition, headquarters regularly receives the summary information it needs for overall corporate management.

Two firms, two different solutions. Only 10 years ago computers were too expensive to consider decentralizing control of them.

Today, however, their prices, including software, are approaching the level where it is foolish to suboptimize computing costs at the expense of the costs of the people who really do the work.

'Try Hitting "Interrupt" and "Load" Again...'

COM Option Improves Image

NEWPORT BEACH, Calif. — Bell & Howell has announced a high-resolution option for its 3700 computer-output microfilm (COM) recorder and 3800 COM system that reportedly improves stroke-generated COM image quality.

The firm also introduced a software library including more than 20 tapes, each dealing with different magnetic tape formats.

The character option features stroked characters in a 14 by 24 stroke matrix. Characters can be formed in upper or lower case, standard, italic or bold font in any of three sizes.

It utilizes OCR-B font with complete Ascii and Ebcdic character sets.

Stroked characters are similar in concept to dot matrix characters because the characters are formed through the use of a series of short strokes, according to a spokesman. The advantage over dot matrix characters is the variety of different fonts that can be formed, he explained.

The tape input program modules now available include eight IBM formats, four Burroughs formats, three Honeywell formats, two Univac formats and modules for the Digital Equipment Corp. DEC-10, Datagraphix, Inc. 4440, Kodac KOM 90, NCR Century and Seaco formats Specialized formats are also available.

These modules, each designed for a different magnetic tape format, permit the 3800 system to directly process print tapes from any specified processor to produce 16mm microfilm or 105 mm microfiche.

The anticipated price for the option is $3,850, the spokesman said from 1451 Quail St., Newport Beach, Calif. 92660.

Should your access control system be

DIGITAL OR CARD?

The answer to that is the system you can work with most easily. And at Sargent & Greenleaf, we think when you compare the two, you'll find digital systems are more flexible. Here's why.

With a digital system you can change your combination whenever you want—every shift or every day for example—and you can change it yourself. Then, simply notify people of the new combination.

With a card system, you generally must rely on someone else to make new cards for you. If an employee loses or misplaces his card or it's stolen, there's a troublesome delay in getting a new card or in some cases *all* new cards issued.

And as your organization grows, it's easier to issue new people the combination than work around the delay of having cards made.

With a digital system, there's never a problem about what to do with old or lost cards. And while it can be said that it's easier to transmit a combination than a card with your name on it, even most sophisticated cards can be duplicated in a matter of minutes.

At Sargent & Greenleaf, we feel the flexibility of changing the digital system *yourself* makes it the easiest to work with. That's why we developed the first digital system. And why we now believe our Code/Tronic access control systems are the most secure and flexible you can install.

We'd be happy to send you a brochure about the Code/Tronic, about the nationwide service network that backs it up, and about us—Sargent & Greenleaf. Over 100 years ago, we started inventing things like the key changing combination lock and the time lock.

CODE/TRONIC®

Ask anyone in the security business about us. Then, ask for the Code/Tronic brochure by writing: Sargent & Greenleaf, One Security Drive, Nicholasville, Ky. 40356.

SARGENT & GREENLEAF, INC.

See us in Booth 2022

Labor Reporting Ranks as Favorite FDC Application

By Frank Vaughan
Of the CW Staff

WETHERSFIELD, Conn. — In a survey of manufacturing companies located in the Northeastern region of the U.S., some 24% of the respondents reported they are current users of factory data collection (FDC) equipment.

Of these users, 95% reported having in excess of 300 employees and annual sales of over $20 million.

The survey was conducted in January by Rolfe Associates, Inc., a manufacturing systems consulting organization here.

The most popular application for FDC is labor reporting, with 80% of the FDC users reporting it in operation. The next most popular uses are time and attendance and inventory tracking, each with a 70% use rate. Sixty percent of the FDC users are utilizing it for work order tracking and 30% reported "other" uses, according to the survey.

For redundant/backup capability, no particular medium has an overwhelming acceptance, with magnetic tape (33%), disk (27%) and controller (18%) showing the most popularity. Diskette (6%) and source documents/paper tape (16%) round out the capabilities in use, the survey showed.

Some 70% of the FDC systems are operating in a batch environment, with the remaining 30% online. Approximately half of the responses indicated that the labor reporting terminals are used for the time and attendance function. Of the remainder, 30% have no time and attendance application and 20% use a badge reader only for time and attendance.

The spectrum of capabilities of the labor reporting terminals in use is quite wide. Variable input is usable in 90% of the applications with numeric inputs proving more popular than alphabetic. Ten- and 22-column badges, as well as 80-column cards and eight- to 12-key function buttons, are usable in 80% of the applications. Character displays of five to 16 characters are in 50% of the terminals and short cards in 10%.

The users indicated a clear majority have plans to either expand or replace their systems, with 10% indicating plans to do both.

Of the firms not currently using FDC, 81% indicated that a review of the potential for FDC equipment or applications is planned. An intent to install FDC equipment or applications was noted by 63% of the nonusers.

When asked which FDC vendors would be considered, the majority of the responses referenced multiple vendors under consideration. "However, 32% of the responses indicated the selection process was open to all vendors or that the vendors to be considered had not been selected. This showed an increasing awareness on the part of the user community that the number of vendors is expanding and new products are entering the marketplace," the report concluded.

Rolfe Associates is at 185 Silas Deane Highway, Wethersfield, Conn. 06109.

The complete $655 line printer.

It's ready to plug in, has an 80-column format, a remarkable MTBF and is 14 times faster than a teletype!

Breaking the hardcopy barrier
It's finally happened! The Axiom EX-800 provides full performance hardcopy at a price compatible with today's low cost micros. This little 80-column machine zips along at 160 characters per second (14 times faster than a teletype) — at a breakthrough single quantity price of $655 for a complete printer.

When we say complete we mean it
The EX-800 is a stand-alone unit with case, power supply, 96 character ASCII generator and interface, paper roll holder, infra-red low paper detector, bell, and multi-line asynchronous input buffer. You won't find these standard features on any other printer, regardless of price!

Our only option
Our printer is so complete, that we offer only one option. A serial interface (RS 232C or current loop) good for 16 baud rates from 50 to 19,200 and thoughtfully provided with a switch for either Centronics or Tally compatibility. Might we call it a Tally-whacker? At $85.00 it certainly should be!

Built-in LSI microprocessor
The heart of the EX-800 is a printed circuit card, containing a custom LSI chip made by Intel to Axiom specifications, which controls all printer functions. Microprocessor power means flexibility. Such as the built-in self test routine and variable character size. It also means reliability. Several industry surveys have shown LSI to be many times more reliable than equivalent conventional circuitry.

The advantages of electrosensitive printing
The EX-800 can print 80, 40, or 20 characters across the five inch wide electrosensitive paper. Under software control, single characters or words may be printed larger for emphasis. The permanence of the hardcopy is archival, because once the aluminum coating has been removed, there is no way to put it back. It's unaffected by sunlight, moisture or heat. Although the printer doesn't provide multiple copies, excellent quality photocopies can be made from the high contrast printout. Also, the paper is inexpensive and readily available, costing about 1¢ for an 8½ x 11" equivalent.

Light, small, quiet, reliable, and versatile
Our EX-800 weighs in at 12 pounds, is just 9½ inches wide, 4 inches high, and 11 inches deep, and is delightfully quiet which makes it ideal for office and other low noise environments. The simple print mechanism is virtually maintenance free. In fact, tests show an incredible MTBF, many times greater than impact printers. This versatile printer is the ideal mate for micros, minis, CRTs, instruments and systems.

THIS LIFE-SIZE SAMPLE SHOWS THE 80-COLUMN PRINTOUT FROM AXIOM'S EX-800 PRINTER
There are 3 character sizes (upper and lower case) which can be MIXED.
This can have the same effect as UNDERLINING or changing COLOR.

Just unbox and plug it in
That's all you have to do to the Axiom EX-800 — apart from pay for it, and at $655 that's almost a pleasure.

Send to: AXIOM
5932 San Fernando Rd.,
Glendale, CA 91202

☐ Urgent. Please phone me at ext ___
☐ Have rep contact me
☐ I'd like to have a demonstration
☐ Send lit including sample of printout

Name _____
Company _____
Dept _____
Address _____
City _____ State _____
Zip _____ Telephone _____

AXIOM AXIOM CORPORATION
5932 San Fernando Rd., Glendale, CA 91202 • (213) 245-9244 • TWX 910-497-2283

See Axiom at NCC. Booth 104 Personal Computing Section

COM Site Based On Eight Factors

(Continued from Page 43)

Lewis encouraged prospective COM users to visit four or five current in-house installations and to tour first-hand any service bureau they may retain.

Prospective in-house users should visit organizations that are similar in size and nature to their company. They should look at how the in-house lab is run and ask questions about the owner's experience and equipment configuration, he suggested.

The service bureaus visited should be clean, neat, organized and have control procedures and documentation. Also, prospective users should check the experiences of present users by obtaining a list of customers and talking with some of them about the quality and consistency of the bureau's work, he advised.

In-house systems offer control, security and equipment configuration tailored to a user's specific needs. Service bureaus offer flexibility of commitment and improved efficiency since users pay only for services received and do not have excess capability sitting around the office, he said.

If properly chosen, bureaus also offer a proven ability to perform, which users may not have in their own in-house installation, he added.

Monarch Adds Two Scanners

DAYTON, Ohio — The models 2243 and 2246 scanners from Monarch Marking Systems read bar-coded data from tags, labels, credit cards and other sources, the firm said.

Each unit consists of an RS-232 serial interface or a parallel interface and a hand-held "light pen," according to Monarch.

A 2243 or 2246 user can scan at speeds ranging from 3- to 30 in./sec forward or backward and over curved surfaces. The scanner logic includes error checks for character validation, bit count, message format and character count.

The Model 2243 costs $825 and the Model 2246 is priced at $870.

Monarch can be reached at P.O. Box 608, Dayton, Ohio 45401.

Handles Large Data Bases

GA 440 DS Features Interactive Cobol Capability

By Toni Wiseman
Of the CW Staff

ANAHEIM, Calif. — General Automation, Inc.'s 440 Data Series (DS) combines the 128K GA-16/440 minicomputer with an interactive multiterminal Cobol capability.

The system also offers large data base handling technology—up to 160M bytes, according to the firm.

The Ansi Cobol offered with the system is one verb short of Level 2, and is said to compile at up to 10 times the speed of a typical IBM 370/145. Minimal conversion efforts are required to run existing Cobol programs from any large IBM mainframe, a spokesman claimed.

Cobol compilations can be made from any number of the 16 terminals in the system while other operations proceed simultaneously, he said.

The 440 DS is the initial product in a potential DS family, the spokesman claimed. Future additions may be based on the firm's 110 and 220 minis, with each system offering different functions based on the capabilities of the CPU, he noted.

The 440 DS is hardware-compatible with all other GA equipment and can use the full line of peripherals available for the Solution Series, he added.

Performance Guarantee

Fortran and Basic will run on the 440 DS, but the operating system has been optimized for Cobol. As a result, GA will not guarantee performance with any language but Cobol, the spokesman indicated.

The spokesman said the 440's operating system had been modified somewhat to accommodate Cobol, but the changes were primarily in the file structure and the interfaces between modules.

The multiterminal system is designed for the sophisticated OEM and Fortune 500 type user; therefore, GA will not be providing any application software for the system, which is said to compete with Data General Corp.'s Eclipse C/300 and Digital Equipment Corp.'s Datasystem 500, according to the spokesman.

The software configuration includes the Control III real-time operating system, the IOS input/output system, a Cobol compiler and runtime library, MTS multiterminal time-sharing system and FMS Isam file management system.

Hardware for a basic packaged system includes the GA-16/440 CPU with 128K bytes of core, a 10M byte disk, 200 line/min printer, 400 card/min reader and two video display terminals.

Communications protocols include 2780 and 3780 emulation, remote job entry, Hasp and others available on the 440 mini.

The 440 DS is available in a credenza package for office environments or in rack-mounted versions for use in computer room environments.

A basic system costs less than $40,800. Identical hardware-only systems for end-user distributed processing systems or OEM products are priced from $32,400. There is no price differential between the credenza and rack-mounted systems, the spokesman added.

Customized systems options include up to two 10M- and/or 80M-byte disk drives, up to 16 CRTs, 600 line/min printer and 25 in./sec tape drives, GA said from 1055 South East Street, Anaheim, Calif. 92803.

GA 440 DS system

DEC Adds Single-Chip PDP-8 Family Unit

By Esther Surden
Of the CW Staff

MAYNARD, Mass. — Digital Equipment Corp. has introduced another member of its PDP-8 family in addition to a word-processing configuration built around it.

DEC Decstation VT78

Designated the Decstation VT78, the system uses a single-chip version of the PDP-8 CPU which is integrated into a CRT terminal. Floppy disks are used as the mass storage medium, the firm said.

The CPU includes an LSI version of the PDP-8 with a 16K-word random-access memory. The display is a Decscope-type video terminal with both alphabetic and numeric keypads, upper and lower case Ascii character set, special symbols and user-defined special function keys, the company added.

The system includes both Fortran IV and Basic compilers for high-level program development and operates under the OS/78 executive, also introduced, which resides on floppy disks.

Disk-Resident Monitor

The OS/78 disk-resident monitor is an extension of DEC's OS/8 executive for tape or disk storage PDP-8 systems, the firm said. It is a single-user executive that permits program development, data storage and numerical analysis to be performed on the stand-alone unit.

Special programs, including special-purpose "bootstrap loaders," can be read into the VT78 via a program injection module that attaches to the terminal. With the RTS/8 real-time monitor, the Decstation can perform multitasking functions, the company noted.

Plug-Attached Peripherals

Designed for large-volume end users and OEMs, the system can operate either in a stand-alone mode or as an element in a network. Peripherals can be plug-attached through ports on the system and are the same peripherals used for other DEC systems.

Peripherals are attached through ports on the VT78 via individual cables, the firm said. Five ports are available: two synchronous serial interfaces for communications or terminals which accommodate speeds from 50 bit/sec to 1.92 kbit/sec; one parallel unit for printers and custom interfacing that is said to provide bidirectional transfers at rates to 15K word/sec; one for floppy disks; and one to facilitate local input of programs.

The system reportedly can run standard PDP-8 programs, allowing users access to the DEC program library or applications developed through the Digital Equipment Computer Users Society.

The WT78 is a word-processing system built around the VT78 with the ability to manage text entry and editing in configurations ranging from stand-alone word processing stations to large, multiuser shared logic networks, DEC said.

Word Station 78

A configuration, dubbed the Word Station 78, includes a single-user system consisting of the WT78, dual floppy disk unit for local mass storage and a letter-quality printer or a 180 char./sec matrix printer.

The unit can operate in conjunction with the firm's PDP-11 with WPS-11M software that can be used in a multiuser information processing network which can handle a mixture of DP and text editing applications.

The software allows as much as 88M bytes of disk to be shared by as many as 48 word processing users, the firm added.

Optional communications software allows Word Station 78 systems to interact with PDP-11s over telephone lines.

The basic Word Station 78 with 16K words of memory, dual floppy disk, CRT and letter-quality printer costs $13,990.

The standard Decstation VT78 with a dual floppy disk drive costs $7,995 with deliveries beginning in September, DEC said from Maynard, Mass. 01754.

Minis Seen Shining in Production Applications

By Esther Surden
Of the CW Staff

NEW HAVEN — Minicomputers can be used to support forecasting, production, purchasing, scheduling, inventory control and production analysis, according to Richard B. Peck, president of EEGO Systems, Inc.

Speaking at a recent conference here, Peck said his firm has been implementing a production control system on a 32K-word Data General Corp. Nova minicomputer that it sells as a turnkey system.

The Nova uses a MICOS operating system from Minicomputer Systems.

The object of production control is to oversee the production process to assure optimum adherence to established standards, he stated.

The production control cycle consists of a demand for a product, allocation of resources, actual production, analysis of the production and planning based on that analysis.

Manufacturers have real orders on hand and an anticipated demand. The combination of the two gives the quantity known as "product demand," Peck explained. "Once I have a product demand, I can run it through the bill of material processor and come up with a resource demand," he said. Resources include facility, labor and equipment.

Many organizations do not consider labor as part of their resources, but it must be allocated just as materials and facilities must be, he noted.

After production, an analysis must be developed from the variance of standards, schedules and previous forecasts in terms of production time, facilities, material and labor, he said.

Future planning can be done purely by the computer, but he stated, this often fails. The Edsel is the best example of computer planning yet, he said.

The best thing is to let the computer give its best estimation and then use judgment based on experience to temper what it recommends.

Dynamic Planning Best

The best kind of planning is dynamic, Peck added. Fixed planning lets the user project in January and evaluate in December what should have been changed in June, he said.

A bill of materials processor can be easily devised to run on minicomputers at less cost than on larger systems, he indicated.

The bill of materials is basically a list of what, when and how much material, facilities and labor is needed to make the various assemblies and subassemblies that go into a particular product. It also indicates the sequence needed to put the product together, he said.

The product master file contains characteristics of a product, such as style number, weight and location.

Beating the System

Exploding files have been the traditional thorn in the side of those attempting to use a bill of materials processor, but Peck said he has devised a method to deal with this—a fast bill of materials processor.

The user would use it for big bulk runs, he said. It explodes to a level specified by the user. Since minicomputers don't perform sorts very well, Peck said he indexes every file.

Peck pointed out that a mistake many users make is that they try to put parameters that belong in the resource file in the bill of materials file. Then they wind up having to change the bill of materials file, he said.

With his method, the file does not need to be updated.

Small System Helps Fast Food Firm Respond to Change

NEW YORK — Quick response to changing conditions is a necessity for every business and a small business system at Office Canteens here is helping this fast food firm keep up with the changes.

"Fast response to the profit and loss picture at each of our 89 units is absolutely essential in this business, and our minicomputer gives us the information we need to make the right management decision," according to Mark Grodin, controller.

The company provides cafeteria-style food to a number of Manhattan businesses.

"Before we installed our small business computer, we were sending all our data out to be processed by an IBM System 3 owned by another division of our corporation. But we weren't getting the information needed for management decisions," Grodin said.

Search for a System

"About a year and a half ago, we looked at a number of stand-alone systems, including IBM, Sycor, Inc. and Singer as well as a time-sharing service, but they simply could not handle our order processing application," Grodin said.

"Futhermore, we found the Basic/Four Corp. system's response to the operator was faster than any of the others we looked at.

"We also like its flexibility, its many program adaptations and the fact it was an interactive, on-line system," he added.

With the help of an outside programming services firm recommended by Basic/Four — Parthenon Systems Ltd. — Office Canteens installed a Basic/Four 32K Model 400 system with disk drive, three video display terminals and medium-speed printer.

"When we saw what the computer could do — especially with the excellent service we received from our programmers — we decided to expand the system to two disk drives and four CRTs," Grodin said.

The system has again become too small, he added. Like many small business system users, the firm kept increasing the number of applications it put on its small system until it reached the limit that could be adequately handled.

It expects to upgrade within the Basic/Four line "as soon as the proposal is approved," Grodin noted.

Applications Performed

Applications currently performed on the computer include processing daily food orders from cafeteria units; accounts payable, accounts receivable and general ledger; determining weekly profit and loss for each cafeteria unit; and control of inventories kept at these units.

"Two of our terminals are used the entire day just to take orders," Grodin explained. "The third terminal handles accounting applications and the fourth is used to put inventory data that is taken each week at our units into the computer.

"All four terminals are in use 90% of the time," he said.

"There's no doubt in our minds that this on-line way of working is saving a great deal of time, as well as giving us more and better reports than we had before," Grodin added.

"We now finish our weekly reports on Wednesdays. In the days when we had to send our information out for processing, we didn't get these reports back until Friday."

In all, approximately 40 reports and listings are being produced by Office Canteens' system.

Among the most important of these are the weekly profit and loss report and weekly food cost report for each canteen unit; inventory price change report; monthly summary of general ledger postings; accounts payable open invoice report; accounts receivable summary and detailed aged trial balance reports; and an order status report showing what is shipped to each unit each day.

"I think the key advantage this system brings to us is summed up in the word 'response,' " Grodin said.

"For instance, our open invoice report in accounts payable shows all our unpaid invoices, and it's automatically up-to-date at any time we ask for it.

"And our accounts receivable aged trial balance reports help us respond better to accounts past due. Before it just took too long to process this information," he said.

"We're still finding more ways of putting this computer to work," he added. "We're putting cash receipts on the system now, in addition to developing new reports to help us monitor our cafeteria units better.

"And we also expect to put our payroll on within the next year or so — and save ourselves about $10,000 a year over what it costs to have it done outside," he added.

VOLUME KEY PUNCHING
(402) 592-1686
"QUALITY AT LOWER COST"
AMERICANA KEY PUNCH
4345 South 89th St.
Omaha, Nebraska 68127

Kodak announces 3 dry, convenient, laser COM's, on-line & off-line.

One step produces completely finished jobs.

Dry—absolutely no solutions, no wet processing.

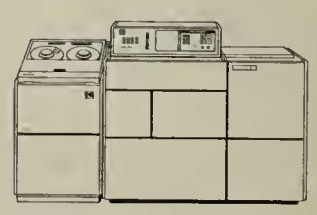
Laser imaging—advanced technology gives outstanding image sharpness on a new Kodak film.

Control software—automates job setup and operation, simplifies operator tasks and training, greatly reduces error potential.

Total convenience—utmost ease of operation, a demonstration will prove it.

Komstar 100 microimage processor—on-line to IBM S360/370 computers, for distributed processing.

Komstar 200 microimage processor—intelligent, on-line to IBM S360/370 computers, saves CPU formatting time.



Komstar 300 microimage processor—intelligent, off-line COM, formats print tapes from most major mainframes.

For the detailed story, write Eastman Kodak Company, Business Systems Markets Division, DP-7915, Rochester, N.Y. 14650.

KODAK KOMSTAR Microimage Processors

Kodak

System Handles Credit Unions

MIDDLEBURY, Conn.—A minicomputer-based turnkey system for credit unions is available from Computeristics.

The on-line, interactive Value-Cu system was designed for credit unions with about 2,000 members. It can handle transactions for share deposits and withdrawals, loan payments and disbursements as well as automatic transactions such as payroll deposits.

Management reports including trial balances and delinquency reports can be produced by the system, the company noted.

The Value-Cu is based on a Data General Nova 3 CPU with 32K words of memory; a 165 char./sec serial matrix printer; a 10M-byte Novadisk with 5M bytes of fixed and 5M bytes of removable storage; and one to three CRTs.

Prices for this typical system range from $39,000 with one CRT to $46,000 with three CRTs. Computeristics is located in the Oxford Management and Research Center, Middlebury, Conn. 06749.

Based on I-8250

NCR Turnkey Works for Moving Firms

DAYTON, Ohio — NCR Corp. has introduced an interactive turnkey system for the moving and storage industry.

Based on the NCR I-8250, the turnkey was designed for the local moving and storage agent associated with a national van line, the vendor said.

Using software written in Cobol 74, the system includes a basic module that performs sales processing, accounts receivable and general ledger.

From data input via CRTs, the system produces over 25 management reports. These include daily and monthly local and van line sales journals, salesmen and driver reports, invoices, commission statements, claims registers and general accounting reports.

The basic hardware includes a 64K-byte I-8250 with a single CRT, 9.8M bytes of disk with one fixed and one removable platter, magnetic tape cassette unit and a 173 char./sec matrix printer.

The basic software module costs $85/mo with an initial $4,075 installation fee which includes application customizing services. The basic hardware costs $46,420 or $1,315/mo on a five-year agreement.

Optional Applications

Optional application modules include order processing for $15/mo, accounts payable for $15/mo and payroll for $35/mo. The optional modules produce about 20 additional management reports, NCR said from Dayton, Ohio 45479.

DP Book Club Serves Hobbyists

TAMPA, Fla.—The Computer Hobbyist Book Club has been formed as a source of computer books for the hobbyist or the professional.

The books are sold at below standard prices, the firm said.

There is no obligation or minimum purchase requirement and subscribers can cancel at any time, a spokesman added.

A book description bulletin is sent every four weeks; at that time, a choice, if any, is indicated, the company said.

Additional information is available from Computer Hobbyist Book Club, 5405B Southern Comfort Blvd., Tampa, Fla. 33614.

IEC Enhances Drilling Monitor

ANAHEIM, Calif. — Interstate Electronics Corp. (IEC) has enhanced its minicomputer-based Adaptive Data Reporting System (ADRS), designed for environmental monitoring of offshore drilling and production platforms. The system can measure wave height, wind speed and direction, ocean currents, air temperature and platform motion on all axes, the firm said.

Based on PDP/8A

Based on a Digital Equipment Corp. PDP-8/A, ADRS also monitors parameters such as rig position, riser angle, ballast conditions, structural stresses and mooring line tension.Trend plots are available from the system as well, a spokesman noted.

The updated ADRS system features a more powerful operating system and can support multiple remote terminals. The basic system is priced below $100,000, the IEC firm noted from 707 E. Vermont Ave., Anaheim, Calif. 92803.

DISK SAVINGS

CARTRIDGES-200 tpi	
Any Sector	
2315-	57.50
5440-	65.00
DATA MODULES	
Trident-80 mb	375.00
CDC 9762-80 mb	375.00
3348-70	1225.00
DISKETTES	
1-4 boxes	37.00 ea.
5-14 boxes	35.00 ea.
15 + boxes	34.00 ea.

VR DATA CORP.
Box 101
Darby, PA 19023
(609) 662-4394

Get the IBM 370-compatible alternative that's backed by systems know-how.

Shown:
Model 480-I

Ask Control Data.

Control Data introduces the OMEGA 480 System – **two compatible, price-conscious alternatives to IBM's 370-135/138 and 145/148.**

Our new OMEGA 480-I gives you half again as much throughput capacity as 370/138—yet costs about the same! And the OMEGA 480-II will exceed 370/148 performance while offering a purchase-price savings of $200,000!

What's more, OMEGA 480 is a space-saving one-half the size of the comparable 370! And, it's field-upgradable. That means you can get OMEGA 480-I now...upgrade it to 480-II capacity later!

Compatibility? OMEGA 480 supports without modification IBM Operating Systems, Program Products, and user programs.

Financing? Several options are available either through our competitively-priced Installment Sales Plan or a selection of 3- to 7-year leases.

But most important, you want service support. And you get it from Control Data! In our support organizations are more than 8,000 dedicated hardware and software specialists—including many with years of IBM system experience. Experience that comes from servicing more than 1,200 current IBM users, and maintaining such Control Data plug-compatible peripherals as Disk, Tape, Memory, Printer and Mass Storage Systems.

The OMEGA 480 Systems are available initially in: Boston, New York City, Philadelphia, Washington, Baltimore and Atlanta; Cleveland, Chicago, Detroit, Milwaukee, Minneapolis, Dallas and Houston; Denver, Portland, Los Angeles and San Francisco. For information phone your local Control Data Representative or write Thomas E. Phillips, Vice President, Peripheral Systems Marketing, Control Data Corp., P.O. Box 0, Minneapolis, MN 55440.

The better business decision

CONTROL DATA CORPORATION

See it in operation at the National Computer Conference, Dallas, June 13-16.

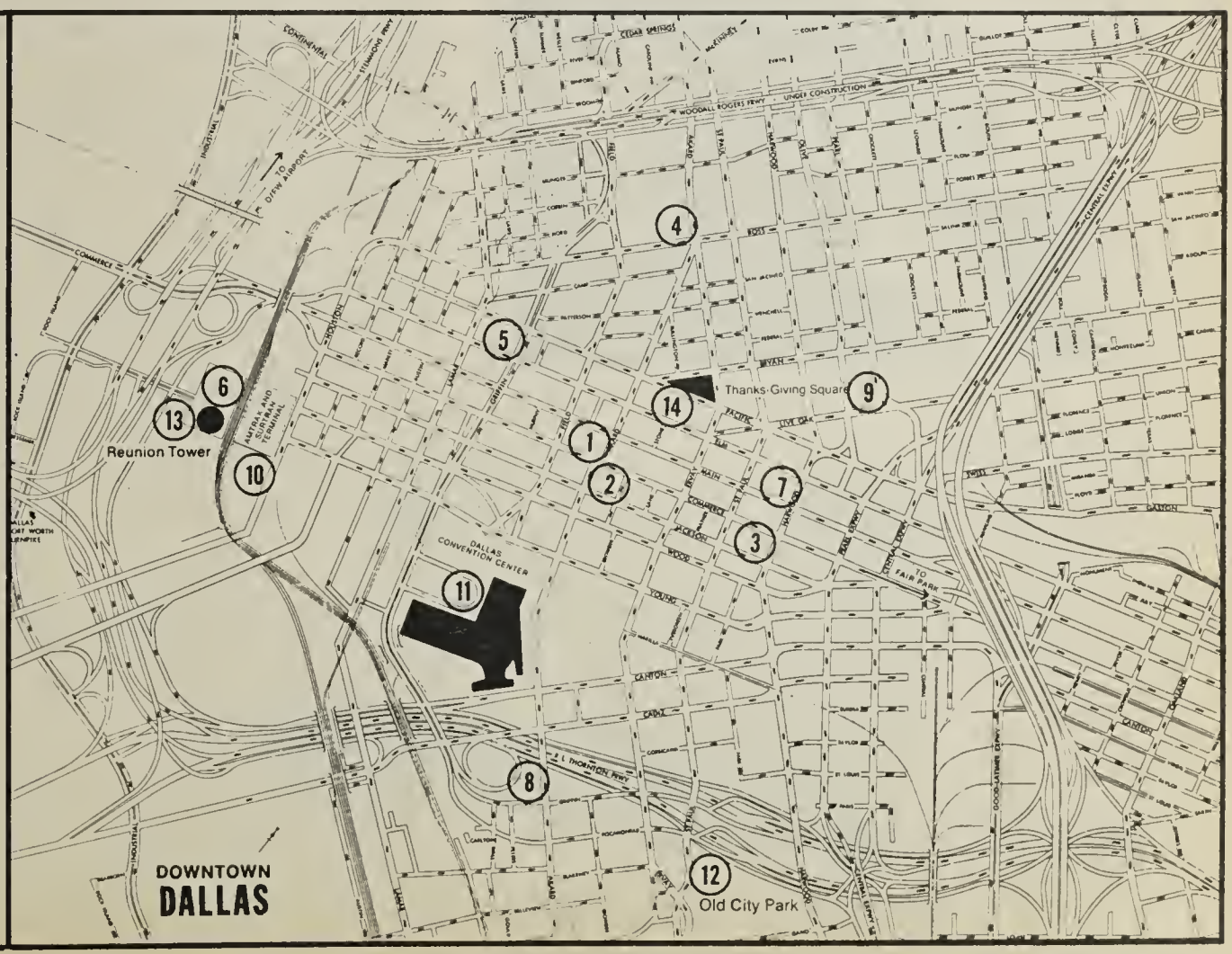
Welcome to NCC '77

Computerworld Previews Events in 'Big D'

Downtown Dallas

1. **ADOLPHUS HOTEL**
   Commerce and Akard
2. **BAKER HOTEL**
   Commerce and Akard
3. **DALLAS HILTON**
   1914 Commerce
4. **FAIRMONT HOTEL**
   Ross and Akard
5. **HOLIDAY INN-DOWNTOWN**
   Elm and Griffin
6. **HYATT REGENCY HOTEL**
   Reunion (Open June, 1978)
7. **MILNER PLAZA HOTEL**
   1933 Main
8. **RAMADA INN-CONVENTION CENTER**
   1011 S. Akard St.
9. **SHERATON-DALLAS HOTEL**
   Southland Center
10. **AMTRAK & SURTRAN TERMINAL**
    400 S. Houston
11. **CONVENTION CENTER**
    717 S. Akard
    Akard and Griffin and Canton
12. **OLD CITY PARK**
13. **REUNION TOWER**
14. **THANKS-GIVING SQUARE**

Prepared by Dallas Convention
and Tourism Bureau
Dallas Chamber of Commerce
1507 Pacific, Dallas, Texas 75201
651-1020
©1977 -- Convention and Tourism Division
Dallas Chamber of Commerce



'A Personality All Its Own'

NCC Will Focus on User, Feature Personal Computing

Key figures at NCC are (clockwise from left) Portia Isaacson, conference chairwoman; Robert R. Korfhage, program chairman; Mark Shepherd Jr., keynote speaker; and A. Douglas Murch, plenary speaker.

THE "SYSTEM"

The software systems house business is rough and tough, an extremely competitive marketplace. One with little margin for error. **Century Computer Corporation** has been in business only a few years. Yet, more and more software systems houses are becoming Century Computer sales representatives. **WHY?**

- **TOOLS.** Up to 512K internal storage. Up to 256 ports. 10 to 300M disc drives. 200 to 600 LPM printers. Powerful operating system software, comprehensive programming languages. Turn-key applications packages.
- **RELIABILITY!** Century Computer's mainframe maintenance is *free!* Period. Now that's quality. Quality only we provide. The others say they do, then turn around and charge $150 to $350 per month for mainframe maintenance. Makes you wonder, doesn't it?
- **SUPPORT.** Complete documentation, both hardware and software. Thorough training for operators, programmers, and maintenance personnel. National and local advertising. Ongoing research and development, aimed at increasing efficiency and reducing costs.
- **VALUE.** Century Computer's O.E.M. prices are low, extremely competitive. Coupled with our free mainframe maintenance, low initial cost makes Century Computer Corporation systems easily the best values ever. Bar none.

Why not hook up with a winning combination? Unlock the door to systems sales you had to turn down because of price considerations. Contact: Steve Sharrock, **Century Computer Corporation**, 2339 Stanwell Circle, Concord, Ca. 94520, (415) 798-8000.

IN **SYSTEMS**-HOUSES

By Toni Wiseman
Of the CW Staff

DALLAS — This year's National Computer Conference (NCC) is going to have "a personality all its own," characterized by user orientation and an emphasis on personal computing, according to Portia Isaacson, the woman behind the whole project.

"There are going to be fewer of the really technical papers this year and I think that's what NCC should be," Isaacson said.

"We now have a number of fine, highly technical conferences, primarily sponsored by the Association of Computing Machinery and the Institute of Electrical and Electronic Engineers and NCC's purpose really is more to serve the user than it is to serve the researcher."

After almost two years of planning, scheduling and managing, the NCC '77 chairwoman is looking forward to the conference's actual occurrence with an anticipation she equated with giving birth.

Isaacson has done virtually nothing but eat, sleep and live NCC for the last year. In fact, being chairwoman is such a full-time job, she only taught one course this year at the University of Texas, where she is an assistant professor of mathematical sciences.

"This is an enormous project — one whose schedule cannot slide. The NCC is going to run June 13-16 whether we are ready or not," she said.

A Fresh Approach

"Users come to see the exhibits and they want a program that suits their needs, and those are not necessarily researchy-type things," she said, noting that in addition to the sessions, a series of one-day seminars or mini courses has been scheduled.

Isaacson is also enthusiastic about the emphasis on personal computing.

Surveys have shown that up to 80% of those involved in hobby computing are either computer professionals or at least on the fringe of the industry, she noted.

"So what we're really hoping is that the personal computing area will motivate people to say: 'Well this really is an interesting or different NCC; I think I'll go to this one'.

"I think the personal computing program, the seminars and the national champion programmer contest will provide people with an interest, an incentive, to come," she added.

Designing the Conference

Two years ago, Isaacson began putting together her steering committee of 15 persons, each of whom has a subcommittee. This means Isaacson was a third-level manager for a project of more than 50 people.

And, while she delegated a large portion of matters pertaining to sessions, speakers and papers to Robert R. Korfhage, professor of computer science at Southern Methodist University and this year's program chairman, Isaacson was still responsible for every item of publicity which appeared and other "fringe activities."

"The conference chairwoman has the prerogative to determine everything about the conference," she stated.

For instance, Isaacson is responsible for the choice of plenary and keynote speakers.

Positive Indicators of Attendance

While hesitant to make even a tentative guess at the number of attendees for this year, Isaacson said there have been a couple of positive indicators. Advance paid registration is running 25% ahead of this time last year, she indicated.

"Another good sign is that the hotel rooms we had originally reserved are now full and we're going further out [of town] to add more hotels to our list to accommodate everyone," she noted.

As for the advantages and disadvantages of holding the NCC in Dallas rather than on one of either coasts, Isaacson said, "It's definitely true that we're not the population center that New York or California is, "but, on the other hand, people in Texas are used to traveling to Austin or Houston for a day trip.

Isaacson pointed out that the Fall Joint in Houston seven years ago had 50% of its attendance from outside the Houston area, whereas NCC is usually 75% local.

What to Do . . .

. . . Night and Day . . .

. . . And How to Get There

By Nancy French
Of the CW Staff

Mansions and Memorials

Dallas visitors from places where trees and grass are commonplace will see the struggle Texans must wage to bring civilization to their dusty earth — and most have done a remarkable job.

A drive down Inwood Road will give some insight into the rich Texan's competitive nature. There each home seems larger, or at least more elaborate, than the last. Some front yards are even adorned with Greek statues.

Most of the golf and tennis clubs are also located in this area.

If you have time, drive through the original Highland Park area — which includes Turtle Creek, Beverly Drive, Lakeside Drive, Armstrong Street and St. Johns.

As for points of interest closer to the city, the John F. Kennedy Memorial Plaza at Main and Market streets at the west end of town is a grim reminder of what happened there 13 years ago.

The memorial is a cenotaph 30 feet high surrounded by a block of black granite, signifying an open tomb for communion.

The John F. Kennedy Museum at 501 Elm — a short cab ride from the convention center and within walking distance of the Holiday Inn — features "The Incredible Hours,' a sound, light and film presentation of that unforgettable day in American history. In addition, a collection of paintings, official photographs and other memorabilia is housed at the museum, open daily from 9 a.m. to 5 p.m. Admission is $1.50. For information call 742-8582.

On a more cheerful note, conventioneers who like rich desserts and would welcome a walk in the Dallas sunshine at noon might enjoy a stroll down to the world-famous Nieman Marcus department store to feast on a cup of home-made style soup du jour, fruit salad with luscious poppy seed dressing and a piece of three-inch high, fresh-baked apple pie or rich and gooey mocha or chocolate cake.

These Nieman's specialties — a far cry from the usual convention fare of hot dogs and colas — are available at Nieman's first-floor Expresso Bar.

The Observation Terrace on the 50th floor of the First National Bank, at Elm and Akard, offers a panoramic view of Dallas — now the nation's eighth largest city. The Terrace is open Monday through Saturday from 9 a.m. Admission is 25 cents, with proceeds donated to charity.

Thanks-Giving Square, an island of serenity surrounded by Akard, Ervay, Bryan and Pacific streets, affirms the reality of gratitude as a common root of great religions and society. The square is open Monday through Friday from 8:30 a.m. until 5:30 p.m.

The John Neely Bryan Cabin at Main and Market across from the JFK Memorial is the first house built in Dallas. The log cabin, which dates back to 1841, is part of the Dallas County Historical Plaza.

If you have a free afternoon, take a drive out to Fair Park, the site of the annual state fair each October. There you'll find the famous Cotton Bowl as well as the Music Hall, Texas Hall of State and Wax World.

Fair Park is also the site of the Dallas Aquarium, the Railroad Museum, the Garden Center, the Health and Science Museum and Planetarium, the Museum of Fine Arts and the Museum of Natural History.

Those wishing to shop and willing to venture a bit out of town might wish to cab up to the Quadrangle. A bit further out on North Central Expressway is Northpark, a complete indoor shopping mall where Nieman Marcus as well as a host of other specialty and department stores are located.

For arts and crafts by local artisans, the Olla Podrida at Coit Road and the LBJ Freeway is the place to go.

The European Crossroads on Northwest Highway just west of Marsh Lane is another shopper's dream.

Discos and Dinner Theaters

While "Big D ain't the Big Apple," conventioneers looking for entertainment after the exhibit hall closes need not go home disappointed.

"Liquor by the drink" became law in 1971, so brown bagging is now a thing of the past. But Big D is a suburban town, and one would do best to have access to a car.

Greenville Avenue, between Lovers Lane and Northwest Highway (a local road parallel to North Central Expressway) is one of the city's two most popular disco enclaves. There, The Pawn Shop, Icabod's and TGI Friday's are highly regarded by Dallas singles. Some of these spots serve meals (see the restaurant guide beginning on the next page).

On the other side of town, on Northwest Highway, just west of Marsh Lane, one can find Carlos and Pepe and The Beggar's. Carlos and Pepe also serves food.

The nearby European Crossroads shopping center, also on Northwest, boasts no fewer than three popular spots. A visit to the Chelsca Street Bar for some of its "great Nachos" might be a good prelude to a visit to the No. 3 Lift or Saturday's, one Dallas single suggested.

In the category of live entertainment, singer Lena Horne will be featured at the Fairmont Hotel's Venetian Room.

Those interested in theater and supper theater might want to consider the following:

- Granny's Dinner Playhouse at 12205 Coit Road will feature Minskey's Burlesque. The theater opens at 6 p.m. with curtain time at 8:15 p.m.
- Country Dinner Playhouse at 11829 Abrams Road and LBJ Freeway (I-635) — a bit out of town — is presenting "Everybody's Girl" starring Rose Marie. The playhouse opens at 6 p.m., with curtain time at 8:15 p.m.
- Windmill Dinner Theatre, 6532 E. Northwest Highway at Abrams Road, will be featuring Tom Poston in "Stuffed Shirt." The performance is presented every day except Monday. The curtain goes up at 8 p.m.
- At Kalita Humphreys Theatre, part of the Dallas Theatre Center, conference-goers can treat themselves to a performance of "Equus." The center is at 3636 Turtle Creek. Curtain is 8 p.m. Tuesday through Friday.

Finding Your Way

If you're lucky enough to get a window seat, your first view of Dallas will be the Dallas/Fort Worth International Airport. The airport is huge, but don't let it throw you.

Head for the baggage claim and the sidewalk and look for the Surtran signs. Surtran is the system of ground transportation serving Dallas and its environs.

Surtran buses leave the airport about every half hour for Surtran's downtown Dallas terminal as well as most of the downtown hotels. Travel time to the terminal from the airport is about 35 minutes; a ride all the way to your hotel might take almost an hour.

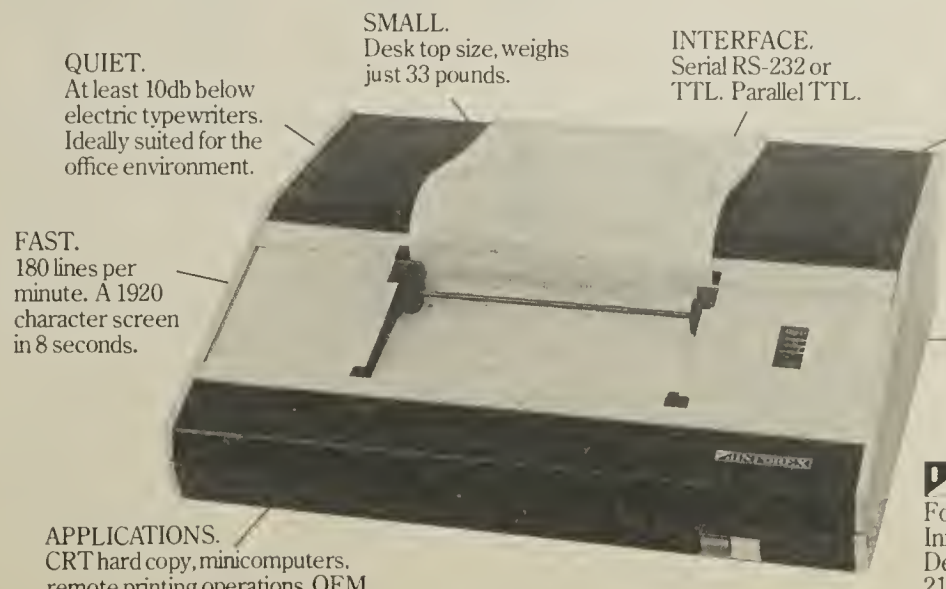
A ticket to the downtown terminal costs $3 and to the hotels, $4.

Surtran taxi service runs about $14 and takes about 30 minutes.

But to really see the town, rent a car.

The Inforex 180 Magnetic Line Printer.
Only the paper is ordinary.

Our patented dry-ink transfer gives you a high quality printout on an ordinary, inexpensive 8½" roll of paper. But everything else about the 180 is definitely *not* ordinary.



INFOREX
For more information, write Inforex, Incorporated, Dept. 588 CW-6, 21 North Ave., Burlington, MA 01803

CONFERENCE AT A GLANCE (continued)

WEDNESDAY

		9:00 - 10:30	10:45 - 12:15	2:00 - 3:30	3:45 - 5:15
BALLROOM A	COMPUTER SCIENCE AND TECHNOLOGY	ANSI/SPARC DATA BASE MANAGEMENT SYSTEM FRAMEWORK *Beatrice Yormerk* 41	DATA BASE STRUCTURE AND ORGANIZATION *Margaret K. Butler* 49	DATA BASE APPLICATIONS *J. Shirley Henry* 55	DATA BASE MANAGEMENT AND THE FUTURE *Lorraine M. Duvell* 63
N222-223		ARCHITECTURE FOR PATTERN RECOGNITION APPLICATIONS *Tedao Ichikewe* 42		DISTRIBUTED FAULT-TOLERANT MICRO-PROCESSOR SYSTEMS *Stephen S. Yeu* 56	Cm*: A MULTI-MICRO-PROCESSOR COMPUTER SYSTEM *Semuel H. Fuller* 64
BALLROOM B		APPLICATIONS OF COMPUTER NETWORKS *Susan S. Poh* 43	DATA COMMUNICATION POLICY AND ITS IMPACT ON THE CONSUMER *Robert R. Korthage* 50	INTERNATIONAL NETWORKS AND PACKET SWITCHING *Saroj K. Ker* 57	MULTINATIONAL DATA COMMUNICATIONS — A MANAGEMENT PERSPECTIVE *Noel Zekin* 65
N224-227		COMPUTER SYSTEMS: A GLOBAL VIEW *Roger M. Firestone* 44	SOFTWARE VALIDATION *Edward V. Reste* 51	PROGRAMMING LANGUAGES: HIGH-LEVEL PROGRAMMING FOR LOW-LEVEL MACHINES *Dennis J. Frailey* 58	PROGRAMMING LANGUAGE THEORY *Nancy A. Betz* 66
BALLROOM C	MANAGEMENT AND APPLICATIONS	AUDITING THE DATA CENTER: A MANAGEMENT APPROACH *John R. Kennedy* 45	WHY MANAGERS FAIL *James F. Towsen* 52	EXECUTIVE SEARCHES IN THE DATA PROCESSING INDUSTRY *Nat P. Turner* 59	DATA BASE DESIGN FOR DECISION SUPPORT SYSTEMS *Howard L. Morgan* 67
BALLROOM D		EMERGING LEGAL ISSUES AND IMPACTS OF ELECTRONIC DATA PROCESSING *Susan H. Nycum* 46	IMPACT OF MICRO-COMPUTERS — 1980 *Robert R. White* 53	PROGRAMMABLE CALCULATORS IN BUSINESS *Julius S. Aronofsky* 60	
E409-410		CONTINUING EDUCATION FOR THE COMPUTER SPECIALIST *Ben Knowles* 47	COMMUNICATION AND EDUCATION *Delle T. Bonnette* 54	COMPUTER SCIENCE PROGRAM ARTICULATION *Ronald P. Rhoten* 61	COMPUTERS IN THE PETROLEUM INDUSTRY *Olin G. Johnson* 68
THEATRE		PERSONAL COMPUTING: HISTORY AND FORESEEABLE FUTURE *Jim C. Warren, Jr.* 48		PRODUCTS OF THE RETAIL COMPUTER MARKET *Adam Osborne* 62	

PROFESSIONAL SEMINARS	
	THE DATA BASE ADMINISTRATOR — *John K. Lyon and Harold S. Schwenk*, BGS SYSTEMS, INC. 8:30-4:30 S411
	INTRODUCTION TO SOFTWARE PHYSICS — *Kenneth W. Kolence*, INSTITUTE FOR SOFTWARE ENGINEERING 8:30-4:30 N215-217
	STRUCTURED DESIGN — *Edward Yourdon*, YOURDON, INC. 8:30-4:30 S412-413
	EDP PROFESSIONAL DEVELOPMENT — *Larry K. Grodman*, Q.E.D. INFORMATION SCIENCES, INC. 8:30-4:30 N230-231

THURSDAY

	9:00 - 10:30	10:45 - 12:15	2:00 - 3:30	3:45 - 5:15
COMPUTER SCIENCE AND TECHNOLOGY	ARCHITECTURE FOR DATA BASE MANAGEMENT *Gerard T. Cepraro* 69	TEXT PROCESSING SYSTEMS *Micheel J. McGill* 77	INFORMATION SYSTEMS — PERFORMANCE ORIENTED DESIGN AND EVALUATION *Alfred G. Dele* 83	
	FAULT-TOLERANT COMPUTING — I *Francis P. Mathur* 70	FAULT-TOLERANT COMPUTING — II *T. R. N. Rao* 78	COMPUTER ARCHITECTURE DESIGN *James E. Brown* 84	
	REMOTE TERMINAL EMULATION *Marshell D. Abrams* 71	PERFORMANCE EVALUATION *Anite Cochran* 79	SPECIAL MEMORY ARCHITECTURES *William E. Centrell* 85	
	SOFTWARE FOR USERS AND MANAGERS *William J. Burns* 72	DISCRETE MATHEMATICAL MODELS *Ranan B. Banerji* 80		
MANAGEMENT AND APPLICATIONS	NATIONAL COMMISSION ON ELECTRONIC FUND TRANSFERS REPORT *William A. Fenwick* 73			
	ADP ACQUISITIONS — CONTRACTING, FINANCING, INVESTING, THIRD-PARTY MAINTENANCE *Louis J. Brocato* 74	DATA BASE — EXTENSIONS AND APPLICATIONS *Andrew B. Whinston* 81	THE COMPUTER IN MANAGEMENT AND BUSINESS *Art Dubnow* 86	
	APPLICATIONS OF DIVERSE TECHNOLOGY AND ITS RELATION TO OCR SYSTEMS *Herbert F. Schantz* 75	OF SENSORS, SONNETS AND SCRAP *Richard W. Lott* 82	SIMULATION METHODS *Eugene B. Smith* 87	
	PERSONAL COMPUTING AND SOFTWARE *William Gates* 76		PERSONAL COMPUTING SYSTEMS *Roger L. Mills* 88	THE FUTURE OF RETAIL COMPUTER STORES *David Wilson* 89

PROFESSIONAL SEMINARS	
	DISTRIBUTED DATA BASE NETWORKS — *Leo J. Cohan*, PERFORMANCE DEVELOPMENT CORPORATION 8:30-4:30 S411
	STRUCTURED INFORMATION — *Robert B. Ware*, WARE ASSOCIATES 8:30-4:30 N230-231
	HOW TO DEVELOP A LONG-RANGE DATA PROCESSING PLAN — *Ben Knowles*, BRANDON SYSTEMS INSTITUTE, INC. 8:30-4:30 N215-217

PLENARY SESSIONS

The '77 NCC will include three special plenary sessions open to all conference attendees. Each will be held in the Theater of the Dallas Convention Center and will feature a major presentation by a nationally-recognized authority on a topic of critical significance to the computing field and to concerned members of the business community.

In his keynote on Monday, June 13 Mark Shepherd Jr., chairman of the board and chief executive officer of Texas Instruments Incorporated, will assess the extension of distributed computing into new applications that were not predictable when the computer revolution began some 25 years ago. On Tuesday June 14, AFIPS President Dr. Theodore J. Williams will deliver a presidential address in which he will analyze the critical role of the applications of computers to industrial systems, with emphasis on industrial process monitoring and control. Critical issues faced by data processing users will be scrutinized at Wednesday's Industry Plenary Session in a featured address by A. Douglas Murch, senior vice president of the Prudential Insurance Company of America. Mr. Murch will focus on current challenges of data processing in the insurance field.

Keynote Address
Monday, June 13
10 a.m., Theatre
Mark Shepherd, Jr.
Chairman and Chief Executive Officer
Texas Instruments Incorporated

AFIPS Presidential Address
Tuesday, June 14
1 p.m., Theatre
Dr. Theodore J. Williams
Professor of Engineering and
Director, Purdue Laboratory for
Applied Industrial Control
Purdue University

Industry Plenary Address
Wednesday, June 15
1 p.m., Theatre
A. Douglas Murch
Senior Vice President
Prudential Insurance Company of America

Foreign Sales Briefing
"The Marketing of Computers and
Related Equipment Abroad"
Tuesday, June 14 and Wednesday, June 15
10:45 a.m.-12:15 p.m., S414
George A. Black, Jr.
U.S. Department of Commerce, Dallas

CONFERENCE AT A GLANCE

MONDAY

		2:00 - 3:30	3:45 - 5:15
COMPUTER SCIENCE AND TECHNOLOGY	BALLROOM A	DATA BASE ADMINISTRATION *Peter Scheuermann* 1	DATA MODELS AND THEIR APPLICATIONS *Peter P. S. Chen* 8
	N222-223	COMPUTER SYSTEMS ARCHITECTURE *Yih-Wu Han* 2	TOWARD THE COMPUTER OF TOMORROW: A MULTI-FACETED CHALLENGE *Lowell D. Amdahl* 9
	BALLROOM B	COMPUTER SECURITY TECHNIQUES *Richard E. Merwin* 3	COMPUTER SECURITY RISK ASSESSMENT *Rein Turn* 10
	N224-227	COMPUTER GRAPHICS *Nancy A. Storch* 4	SYMBOLIC EVALUATION *Edward F. Miller, Jr.* 11
MANAGEMENT AND APPLICATIONS	BALLROOM C	DEVELOPMENTS IN COMPUTER OUTPUT MICROFILM (COM) AND MICROGRAPHIC TECHNOLOGY — PRESENT AND FUTURE *Don M. Avedon* 5	
	BALLROOM D	HOW TO SELL, SERVICE AND SUPPORT CUSTOMER NEEDS WITH SMALL BUSINESS COMPUTERS *Donald W. Fuller* 6	COMPUTER BASED INFORMATION SYSTEMS FOR THE SMALL FIRM *Frederick F. Newpeck* 12
	E409-410	CLINICAL APPLICATIONS OF THE COMPUTER *Lynn L. Peterson* 7	THE COMING AGE OF COMPUTER BASED MEDICAL CONSULTATION: WILL IT BE FAIR? *John Lackmann* 13
	THEATRE		

TUESDAY

		9:00 - 10:30	10:45 - 12:15	2:00 - 3:30	3:45 - 5:15
COMPUTER SCIENCE AND TECHNOLOGY		SELF-ORGANIZING/SELF-OPTIMIZING DATA BASES *Gene Altshuler* 14	ADVANCED CONCEPTS IN DATA BASE MANAGEMENT *Gene Altshuler* 22	USER EXPERIENCE WITH RELATIONAL DATA BASE SYSTEMS *Michael Stonebraker* 27	DATA BASE DESIGN METHODOLOGY *Philip Y. Cheng* 35
		SELECTION METHODS FOR A FAMILY OF COMPUTER ARCHITECTURES *Y. S. Wu* 15		COMPUTER HARDWARE DESIGN *William P. Summers* 28	GOVERNMENT PANEL ON RESEARCH IN COMPUTER ARCHITECTURE *Jimmie R. Suttle* 36
		MICROPROCESSOR ARCHITECTURES *Charles R. Vick* 16		OUTPUT — RESULTS AND RHETORIC *James O. Matous* 29	MAN-MACHINE INTERFACE *Seymour Jeffery* 37
		SOFTWARE MANAGEMENT: PLANNING FOR A NEW SOFTWARE DEVELOPMENT PROJECT *Richard H. Thayer* 17		DATA STRUCTURES *Julie E. K. Landstein* 30	MINI AND MICRO DESIGN MISTAKES *Helmut Thiess* 38
MANAGEMENT AND APPLICATIONS		SYSTEMS STRATEGIC PLANNING — A VIEW FROM THE TOP *Harvey L. Poppel* 18	THE MANAGEMENT OF DISTRIBUTED COMPUTING IN LARGE ORGANIZATIONS *Larry D. Woods* 23	ICCP AND CERTIFICATION MOVE FORWARD *Fred H. Harris* 31	THE CERTIFICATE IN DATA PROCESSING/CERTIFICATION EXAM FOR PROGRAMMERS *William W. Cottermen, William J. Horne* 39
		HUMANISTIC PERSPECTIVES ON COMPUTER CENTER MANAGEMENT *Jack L. Stone* 19	GUIDELINES FOR COST ACCOUNTING PRACTICES FOR DATA PROCESSING *Norman Statland* 24	COMPUTING AT LOS ALAMOS IN THE FORTIES AND FIFTIES *J. B. Harvill* 32	
		COMPUTER SYSTEMS IN HEALTH CARE DELIVERY AND MEDICAL LABORATORIES *William J. McClein* 20	EDUCATION FOR MEDICAL INFORMATION SCIENCE *Richard E. Pogue* 25	CODASYL VS. MUMPS FOR MEDICAL DATA BASE MANAGEMENT *Gio Wiederhold* 33	COMPUTER TECHNOLOGY IN THE INFORMATION/LIBRARY FIELD *Merilyn Johnson* 40
		COMPUTERS AND THE DEAF *Gordon R. England* 21	PRIVACY AND SOCIAL ISSUES *Herbert B. Safford* 26	UNETHICAL CONDUCT IN COMPUTER SCIENCE AND TECHNOLOGY *Donn B. Parker* 34	

PROFESSIONAL SEMINARS

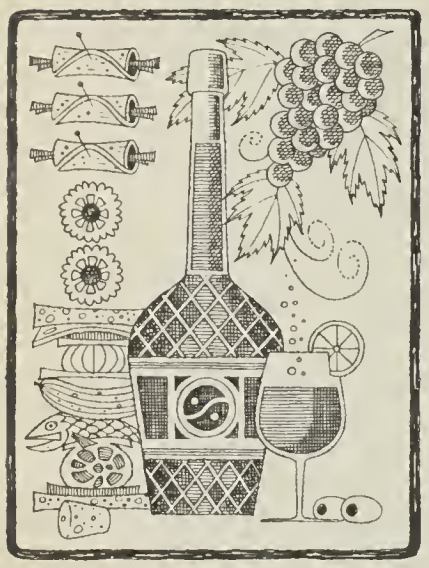
COMPARING DATA BASE SYSTEMS — *William E. Linn and Thomas F. Meurer*, CULLINANE CORPORATION
8:30-4:30
N230-231

MICROPROCESSORS — *Adem Osborne*, OSBORNE & ASSOCIATES, INC.
8:30-4:30
N215-217

SOFTWARE DESIGN TECHNIQUES — *Peter Freeman and Anthony Wasserman*, SOFTWARE ENGINEERING CONSULTANTS
8:30-4:30
S412-413

INTRODUCTION TO COMPUTER NETWORKS — *Ira W. Cotton*, COMPUTER NETWORK ASSOCIATES
8:30-4:30
S411

Restaurants



AMERICAN

Arjun's. 4220 Oak Lawn, 526-4050.
Bijou. 500 Medallion Center, 691-3037.
Calabration. 4503 W. Lovers Ln., 351-5681. Copper and leather accented decor. Specializing in family style, American food.
Ciro's. 3237 McKinney Ave., 745-9464
Coco's Famous Hamburgers. 12910 Midway Rd., 247-2277. American food, specializing in hamburgers.
Crossroads Junction, Inc. 2828 W. Northwest Hwy., 350-5755. Specialty is steak, live entertainment.
Crystal Tarrace Restaurant. Music Hall at Fair Park, 821-0591. Buffet featuring prime roast beef.
Good Times Restaurant and Bar. One Main Place, 744-1834. American food, entertainment.
J.B. Hamby's. 214 N. Akard St., 748-3426. Hamburgers, chicken fried steak.
Hamburgers by Jamie's. 3817 Lemmon Ave., 522-3580. Specializing in hamburgers and shoe string potatoes.
Harper's Cornar. Hilton Inn Central, 5600 N. Central Expwy., 827-4100.
Houlihan's Old Placa. 84 NorthPark East, 361-9426. Variety of dishes, antiques and curios in decor.
Ichabod's Restaurant. 5500 Greenville Ave. No. 201, 691-2646. Variety of American food.
Kitchan Kattla. 1603 Elm St. 741-2744. American food, Southern dishes.
Lucas B & B Restaurant. 3520 Oak Lawn Ave., 526-8525. Variety of food, informal atmosphere.
Mad Cap Molly's. 175 Walnut Hill Vlge., 350-5936. Sandwiches and bar.
Matro Food Shops, Inc. 3033 Gaston Ave., 821-5272. Variety of food, specializing in waffles. Informal atmosphere.
Tha Railhaad. 6919 Twin Hills Ave., 369-8700. Antebellum railway station decor with live entertainment. Prime rib, steaks, lobster, Alaskan king crab specialties.
Raintraa Restaurant. 2828 W. Northwest Hwy., 350-5755.
Southarn Kitchan. West: 2356 W. Northwest Hwy., 352-5220. East: 6615 E. Northwest Hwy., 368-1658. Chicken, seafood, steaks and lobster tail. Old South decor.
T.G.I. Friday's. 5500 Greenville Ave., 363-5353. New York antique bar and restaurant.
Twanty Ona Turtla Craak Club of Dallas. 3883 Turtle Creek Blvd., 528-4090. Private club.
Victoria Station. 2910 Routh, 651-0381. Specializing in prime rib. Old railroad cars and British railway decor.
Walls's Cataring and Rastaurant. 10749 Preston Rd., 691-4444. Specializing in cheese blintzes, rolled cabbage and apple strudel. Contemporary decor.
Wycliffa Point, LTD., Tha. 2525 Wycliffe, Suite 130, 528-2030. Hamburgers.
Yolk's On You. 8202 Park Lane, 361-6511.

CONTINENTAL

Arthur's. 8350 Northwest Hwy. in Campbell Centre, 361-8833. Elegant decor. Specialing in prime steaks, seafood and crab Lorenzo.
Bagatalla Rastaurant. 4925 Greenville Ave., 692-8224. European gourmet cuisine, semiformal atmosphere.
Ballmastar Rastaurant and Club. 13601 Preston Rd., 661-9353. Continental dishes, seafood specialties, live entertainment.
Brannan's Restaurant. One Main Place, Plaza level, 742-1911. Specializing in French and Creole cuisine. Featuring "Breakfast at Brennan's."
Carlos & Papa. 3049 W. Northwest Hwy., 358-4357.
Chataaubriand. 2515 McKinney, 741-1223. Specializing in French and continental food. Greek decor.
Enclave Restaurant and Club. 8325 Walnut Hill Ln., 363-7487. Continental food specializing in meat entrees. Formal decor.
Ewald's. 5415 W. Lovers Ln. 357-1622. Continental specialties including veal, fish and beef. Continental decor.
1520 A.D. 3800 W. Northwest Hwy., 350-5748. Dinner theater, medieval English decor.
Gran' Crystal Palaca Thaatra. 2424 Swiss Ave., 824-1263. Dinner theater, formal dining.
Grapa Restaurant, Tha. 2808 Greenville Ave. 823-0133. European cafe specializing in cheese, wine, homemade soups.
Marlo's. 135 Turtle Creek Vlg., 521-1135. Elegant, intimate decor. Specializing in continental cuisine.
Mr. Peppe. 5617 W. Lovers Ln., 352-5976. Specializing in pepper steak, veal cordon bleu, rack of lamb.
Old House. 5720 E. Mockingbird Ln., 821-9200.
Papillon. 7940 N. Central Expwy., 691-7455.
World Trade Cantar Club. 2050 Stemmons Pwy., 744-1104. Specializing in international cuisine. Elegant Southwestern decor.

FRENCH

Calluaud's Restaurant. 2917 Fairmount, 745-9571. French cuisine specializing in Quiche Lorraine, fresh salmon, steak au poivre vert.
Chablis. 125 The Quadrangle, 651-0290.
La Vlailla Varsovia. 2610 Maple, 528-0032. Specializing in French cuisine. Old world atmosphere.
La Bistro. 3716 Bowser, 528-4181. French food, formal atmosphere.
Marcal's Rastaurant. 5721 W. Lovers Ln., 358-2103. French chef-owner specializes in dover sole and Beef Wellington. French provincial decor.
Patry's Restaurant. 2504 McKinney, 748-3754. Specialties are chicken marinated, roast rack of lamb and duck.
Pyramid Room. Fairmont Hotel, Ross and Akard, 748-5454. Gourmet food.

GERMAN

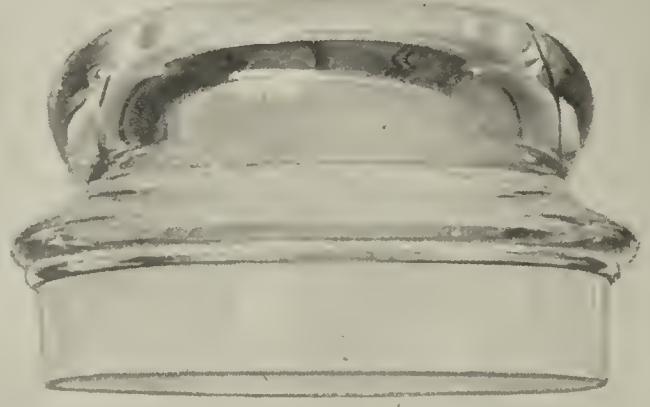
Black Forast Bakary. 5819 Blackwell, 368-4490.
Blue Front Restaurant. 1310 Elm St., lower level, 741-7560. Specializing in pig knuckles, polish sausage, potato salad and homemade soups.
Jagarstuba Restaurant. 7811 Inwood Rd., 352-5812. German food.

GRECIAN

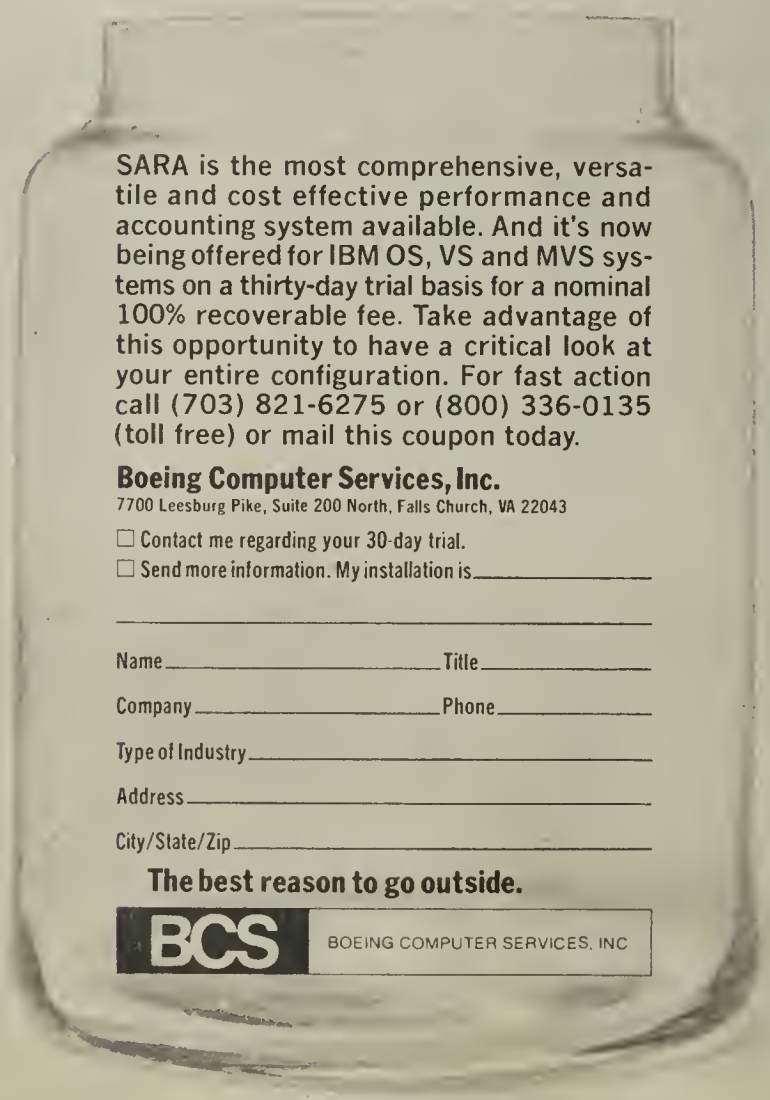
Goldfingar. 2905 Cridelle, 350-6983. Specializing in Greek and continental food. Modern Greek decor.
The Torch. 3620 W. Davis, 331-5221. Specializing in Greek cuisine. Greek decor.
Zorba Greek Cafe. 202 N. Ervay, 745-9369. Greek Food.

ITALIAN

Gino's Rastaurant. 5217 Ross Ave., 824-1410. Italian specialties. Family atmosphere.
Godfathar, The. 6550 Abrams, 341-8724. Italian specialties.
Ianni's Italian Rastaurant. 2230 Greenville Ave., 826-6161. Italian garden decor. Specializing in homemade pastas and Italian delicacies.
Il Sorranto. 8616 Turle Creek Blvd., 352-8759. Old Italian decor. Classical Italian cuisine specializing in hot antipasto, cannellon and veal zingara.
Old Spaghetti Warahouse. 1814 N. Market, 651-8475. Specializing in spaghetti and lasagna with San Francisco sour dough bread. Authentic antique decor.



Take a 30-day course in bottleneck removal.



SARA is the most comprehensive, versatile and cost effective performance and accounting system available. And it's now being offered for IBM OS, VS and MVS systems on a thirty-day trial basis for a nominal 100% recoverable fee. Take advantage of this opportunity to have a critical look at your entire configuration. For fast action call (703) 821-6275 or (800) 336-0135 (toll free) or mail this coupon today.

Boeing Computer Services, Inc.
7700 Leesburg Pike, Suite 200 North, Falls Church, VA 22043

☐ Contact me regarding your 30-day trial.
☐ Send more information. My installation is_____

_____

Name_____ Title_____

Company_____ Phone_____

Type of Industry_____

Address_____

City/State/Zip_____

The best reason to go outside.

BCS BOEING COMPUTER SERVICES, INC

SARA versions are also available to support Honeywell, CDC, and Univac systems. Call or write for information.

MEXICAN

A. Mariano's. Old Town Vlge., Greenville at Lovers Ln., 691-3888. Mexican atmosphere. Specializing in authentic and Texas-style Mexican cuisine.
Annie's Santa Fe. 6881 Greenville Ave., 369-8600.
Casa Dominguez. 2127 Cedar Springs, 742-4945. Specializing in Austin, Texas-style Mexican food. Spanish cantina decor.
Chiquita Restaurant. 3325 Oak Lawn, 521-0721. Specializing in carne asada, chiles rellenos and flautas. Spanish decor.
Desperados. 4818 Greenville at University, 363-1850. Gourmet Mexican and Tex-Mex specialties. Mexican cantina atmosphere.
El Chico. 2031 Abrams, 821-5785; 165 Inwood, 352-3307; 305 Medallion Ctr., 363-0584; 110 W. Davis, 943-8610; 707 Preston Royal Vlge., 363-2671; 13247 Montfort, 661-2772; 3353 W. Northwest Hwy., 357-8264; 5412 E. Mockingbird, 827-2500. Specializing in Mexican food. Spanish decor.
Esperanza Restaurant. 1928 Bryan St., 747-5782. Mexican food.
Los Mexicanos. 2525 Wycliff, Suite 126, 528-8180. Mexican food, informal atmosphere.
Pedro's Restaurant. 2905 Greenville Ave., 823-1641. Mexican food.
Raphael's. 3701 McKinney Ave., 521-9640. Mexican food.
Tupinamba Restaurant. 3071 W. Northwest Hwy., 352-8570.
Villa Placita Restaurant and Club. 13020 Preston Rd., 661-8354. Mexican cuisine and decor.

STEAK HOUSE

Baby Doe's Matchless Hines. 305 Harry Hins Blvd., 741-9771.
Bobby McGee's Conglomeration Restaurant. 6400 E. Mockingbird in Hillside Vlge., 826-9020. Specializing in steak, lobster and prime rib. Antique decor.
Bodega Restaurants of Texas. 12810 Hillcrest, 233-6627. Steak, beef.
Bavarian Steak House. 7724 N. Central Expwy., 363-7848. Specializing in prime rib, steaks, seafood, fowl and beef fondue. Bavarian hunting lodge decor.
Charco Broiler Steak House. 413 W. Jefferson, 942-6806. Modern decor. Specializing in steaks.
Daddy$ Money. 5500 Greenville Ave., 363-8686. Specializing in steaks, lamb and scampi. Simplistic elegant decor.
Jamil's Steak House. 2907 W. Northwest Hwy., 352-9071. Specializing in steaks, lobster tails and rib dinners. Mediterranean decor.
Kirby's Charcoal Steaks, Inc. 3715 Greenville Ave., 823-7296. Contemporary decor. Specializing in steaks.
Old San Francisco Steak House. 10965 Composite Dr., 357-0484. Steaks, live entertainment.
Pelican's Wharf. Northwest Hwy. at Skillman, 361-9813. Specializing in aged beef, king crab, lobster, prime rib. California beach and wharf decor.
Randy Tar Restaurant. 7034 Greenville Ave., 691-7102. Steaks.
Unique Steak & Seafood House. 1500 Commerce, 742-6304. Specializing in lobster, shrimp, seafood, steaks and prime rib. Modern decor.

TEXAS SPECIALTIES

Big Al's Barbeque #2. 1807 Main St., 651-0382.
Buckboard Barbecue. 1330 W. Pioneer, 259-3525. Barbeque beef, pork, etc.
Bump's Smokehouse & Saloon. 5734 E. Lovers Ln., 691-7320.
Elliott's Hickory Dock. 4230 Oak Lawn, 526-9588. Barbecue beef, pork.
Genghis Khan Mongolian Feast. 4830 Greenville Ave., 361-0280. Unusual barbecue.
Henriette's Bar B-Q & Club. 2701 Live Oak, 823-9360. Barbecue.
Johnny's Barbecue Roundup. 274 Exchange Park North, 352-9295. Specializing in barbecue beef, sausage, ham, ribs and hot links. American conventional decor.
Randy's Barbecue Restaurant. 3260 Irving Blvd., 638-3692. Barbeque sandwiches and plates.
Roe's Pit Barbeque. 1414 N. Industrial Blvd., 747-9033. Specializing in barbecue, beef, ham, ribs, chili and Southern-style breakfast.
Tolbert's Texas Chili Parlor. 802 Main, 742-6336. The "chili parlor" and Museum of Chili Culture is run by one of the founders of the Chili Appreciation Society International, Dallas News columnist Frank X. Tolbert.

ORIENTAL

Benihani of Tokyo, Inc. 12700 Park Central Place, 387-4404. Japanese food cooked on the table.
Canton Restaurant. 5519 W. Lovers Ln., 357-4486. Specializing in Chinese food.
China Clipper Cafe. 3930 McKinney, 526-9165.
China Inn Restaurant. 6521 E. Northwest Hwy., 369-7733. Cantonese dishes, intimate decor.
Chinese Palace Restaurant. 10011 Harry Hines, 350-7192. Chinese decor. Specializing in Cantonese cuisine.
Chu's Restaurant. 15080 Beltway Dr., Addison, 387-1776.
Ho Toy Chinese Restaurant. 3411 McKinney Ave., 522-8431.
Hoho. 341 Hillside Vlge., 826-0980.
House of Gong. 3726 W. Northwest Hwy., 352-8248. Specializing in Chinese and American food. Oriental decor.
Hunan Chinese Restaurant. 2230 Greenville Ave., 826-6161. Spicy Chinese food, small, intimate decor.
Japanese Steak House. 9515 Overlake, 357-4091. Specializing in tempura, teriyaki steaks, sukiyaki and teppanyaki. Japanese decor.
Kobawoo Restaurant and Food Store. 5732 Cedar Springs, 350-1072. Oriental and exotic foods.
Kowloon Restaurant. 4117 Lemmon Ave., 528-9980. Chinese food. Oriental decor.
Lim Yee Cafe. 2007 Abrams, 824-9503.
Royal China Restaurant. 7525 Greenville Ave., 368-3304. Specializing in teppanyaki, teriyaki, teriyaki, sukiyaki and tempura. Japanese decor.
Sing's Chinese Restaurant. 210 Preston Royal Shopping Ctr., 361-1771. Chinese food.
Royal Tokyo Restaurant. 8409 Preston Rd., 368-4303. Chinese specialties. Oriental decor.

QUICK LUNCH

Beks Charbroilers. 14 locations in Dallas.
Great Outdoor Sub Shop. 325 N. Akard, 742-0984. Specializing in submarine sandwiches and ice cream. Ecological decor.
New York Sub-Way. 1705 Live Oak, 744-2371. Eastern-style submarine sandwiches. Bright decor.
Neleman Marcus Expresso Bar. Main at Ervay. Soups, fruit salad, some sandwiches and elaborate desserts.
Sanger-Harris Hasty Buffet and Delicatessen. Pacific and Akard, 651-2424.
Sub-Total Submarine Sandwich Shop. 1322 Elm St., 741-4211. Submarine sandwiches.
Titche's Buffet and Malt Bar. Main, Elm and St. Paul, 748-4811.
Top of the Stairs, The. 1404 Main St., second floor, 742-0006.

Restaurants

NEW
LOW-COST
300 LPM
ChainTrain™

Chaintrain type carrier design ensures precise vertical print alignment and permits interchangeable slugs.

Sub-systems incorporate proven DPC quality and dependability with price-performance features serving thousands of satisfied customers.

Our only business is designing and manufacturing a reliable family of impact line printers at speeds of 300 lpm to 1,000 lpm with 64 character set.

Low-cost in OEM quantities. Compares very favorably with our competition. Come see our new 300 lpm and the rest of our family at NCC booth #1133. You'll be pleasantly surprised.

Data Printer Corp
The one to remember

600 MEMORIAL DRIVE, CAMBRIDGE, MA 02139
Sales Offices: Costa Mesa, CA. • Clifton, N.J. • Melbourne Beach, FL.

NCC Booth #1133

Communications at NCC

Harris Corp.

DALLAS – Harris Corp.'s Data Communications Division will be demonstrating the Model 1600 distributed processing system and the 8180 intelligent terminal system in Booth 1333.

Auxiliary memory and a line of remote printers for the Model 1600 family are also among the new products scheduled to be shown for the first time.

The 1600 is equipped with peripherals including a card reader, magnetic tape drive, eight CRT stations and the Model 1676-99 remote printer – one of three recently introduced printers from the firm.

It will be shown performing remote batch emulation, source data entry and a data base inquiry/response application, according to a spokesman.

Harris 8180

The three remote printers were designed mainly for hard-copy output of CRT terminal displays, but also can produce reports directly from a 1600 processor.

The models include a 90- to 240 line/-min printer, an 888 char./sec matrix printer and a 15 char./sec typewriter printer. Printer/CRT combinations may operate locally with the 1600 or from remote sites, the spokesman noted.

The auxiliary memory for the 1600 allows users to expand the number of local and remote data entry terminals and programs they can run concurrently with remote batch operations, according to the spokesman. The memory will be available in 16K-byte and 32K-byte increments.

The 8180 is formerly from Sanders Data Systems, which Harris acquired earlier this year.

The system, which can include up to 32 keyboard/display units, 32 printers and buffer memory in addition to dual diskette or cartridge disk storage, emulates the IBM 3270, the spokesman said.

In addition, it will be shown emulating terminals used with Burroughs, Honeywell and Univac mainframes at NCC, he noted.

Other products which will share the limelight at the Harris booth include the Model 500 entry-level remote batch terminals and the mid-range 1200 family of remote intelligent batch terminals.

Harris' Data Communications Division is at 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234.

Teletype Corp.

DALLAS – Visitors to Booth 1505 will be able to view Teletype Corp.'s Model 40/4 series of keyboard display and printer devices, which offer synchronous Ascii or Ebcdic communications over multipoint private-line facilities.

The units can be clustered in groups of one to 36 devices and have speeds of 2,400-, 4,800- or 7,200 bit/sec, according to a spokesman. The 40/4 terminals have computer-controlled formatting and employ binary synchronous protocol.

In addition to the 40/4 series, Teletype will also exhibit its Model 43 matrix teleprinter featuring 30 char./sec operation, up/low printing and 132-column format capability.

It costs $1,205 from the firm at 5555 Touhy Ave., Skokie, Ill. 60076.

Universal Data Systems

DALLAS – Universal Data Systems plans to show its line of communications testers and modems in Booths 1601 and 1603.

The Comtest tester, priced at $7,150, is a microprocessor-based unit that can operate in either full- or half-duplex mode and contains a 16-line, 512-character CRT display. It can monitor an entire communications system or can emulate either the CPU or various terminal devices, the firm said.

The data buffer can store, retrieve and display up to 1,500 characters with optional expansion to 3,500 characters, the firm added.

The UDS 12-12 modem, available in single model stand-alone configuration, rack-mounted packages or in ultimate modem racks, has two-wire full-duplex 1,200 bit/sec capability and its interface conforms to RS-232C interface standards, the company added from 4900 Bradford Drive, Huntsville, Ala. 35805.

An Editing Pet That

The perfect editing terminal for transaction processing must be more than a little bit smart. It has to be wise like our OWL-1200. With features that assure high accuracy source data entry, fast data editing, simplified host computer programming, and reduced host computer loading.

Our OWL gives you all the human engineering features you get with our FOX-1100, plus a lot more. And the price is right. Just $1496 in quantities of 25.

Check the comparison chart of editing terminals to see all the reasons why the OWL-1200 is simply "incomparable."

USER REQUIREMENT	FEATURES	PERKIN-ELMER OWL-1200	HAZELTINE MOD. 1 EDITING	LEAR SIEGLER ADM-1A	LEAR SIEGLER ADM-2	ADDS 980
High Operator Data Entry Accuracy	Protected fields	Yes	Yes	Yes	Yes	Yes
	Low-intensity fields	Yes	Yes	Partial	Partial	Partial
	Numeric only fields	Yes	Yes	No	No	No
	Inverse video fields	Yes	Yes	No	No	No
	Blink fields	Yes	Yes	No	Yes	Yes
	Line drawing capability	Yes	No	No	No	Yes
Simple, Fast Editing of Data	Insert/delete character	Yes	Yes	Partial[1]	Yes	Yes
	Insert/delete line	Yes	Yes	Partial[1]	Yes	Yes
Minimized Loading on Host Computer	Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header.	Yes	No	No	No	No
Simplified Programming	Ability of host CPU to read device status	Yes	No	No	No	No
	Ability of host CPU to read device mode key settings and communication option straps	Yes	No	No	No	No
	Program override on mode key settings	Yes	No	No	Yes	No
Simplified Program Debugging	Transparent mode permits all characters to be displayed	Yes	No	No	No	No
Cost Effectiveness	OEM price in quantities of 25*	$1496	$1670	$1795 + $1595	$2395 + $2095	$1995

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters. [1]No Key. Requires Two Key Code.

+ Just announced price changes

PERKIN-ELMER DATA SYSTEMS | TERMINALS DIVISION

Randolph Park West, Route 10 & Emery Avenue
Randolph, N.J. 07801 (201) 366-5550 TWX: 710-987-7913

Overseas, call: 44895-52441 Uxbridge, UK
887-1000 Sydney, Australia
416-677-8990 Mississauga, Ontario, Canada

Communications at NCC

Wavetek Data Communications

DALLAS – The ADC 1500 controller for computer/communications systems will be on display in Booth 1253 by Wavetek Data Communications.

The ADC 1500 will handle up to 32 I/O lines with receive data sets in two-line increments and provides up to 123 tracks (32-word increments).

Unit Features

The unit features Touch-Tone input/-voice output; Touch-Tone input/FSK output; Ascii speeds of 110-, 150- and 300 bit/sec; simultaneous operation of multiple I/O lines; and a remote diagnostic capability.

The voice response is from prerecorded words or phrases on addressable tracks up to the maximum of 123, the firm said, adding the playback time is .5 sec/track.

Interface Links

The unit can interface to a host computer over a 1,200 bit/sec Ascii channel or up to 9,600 bit/sec over a Bisync III link.

Wavetek is at P.O. Box 651, San Diego, Calif. 92112.

Codex Corp.

DALLAS – Booths 2062 and 2063 will house a variety of Codex Corp. data communications equipment including the 600 series of network processors, the multipoint network control system, the circuit quality monitoring system, the LSI series of modems and the 900 series of time division multiplexers.

The 6030 intelligent network processor, priced at $230/mo on a three-year lease, functions as a statistical multiplexer and features dynamic allocation of bandwidth and data compression. The unit comes in various models to handle from 28 ports up to 124 ports and the standard asynchronous speeds supported include 75-, 110-, 134.5-, 150-, 300-, 600- and 1,200 bit/sec with other speeds available as options.

Circuit Quality Monitor

The circuit quality monitoring system, priced at $175/mo on a three-year lease, can monitor, test and diagnose network performance by monitoring and storing tape coefficients, eye patterns, hits, line degradations and error coefficients. The unit monitors up to 64 modems from one console and features a synchronous and asynchronous test set, the firm said.

The multipoint network control system features central site diagnosis of multipoint network faults, programmable system restoral functions and local and remote antistreaming functions. It costs $155/mo on a three-year lease.

In addition, eight modems will be on display, the firm said from 15 Riverdale Ave., Newton, Mass. 02195.

's Wise as an Owl

OWLS
AILABLE FOR
LIVERY NOW!

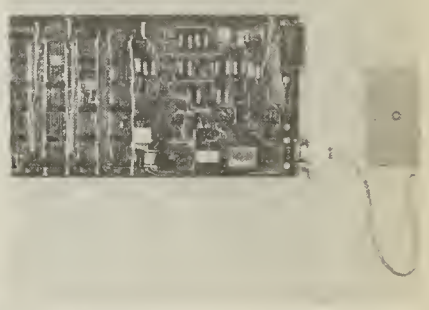
Please send me more information on the OWL 1200.

Attach your business card here.

Vadic Corp.

DALLAS – Vadic Corp. will show the Model VA317S direct connect 300 bit/-sec modem and a line of data access arrangements in its display in Booths 1835 and 1837.

The VA317S was the first modem to be registered by the Federal Communications Commission for direct connection with the switched telephone network under the full long-form registration process. The unit includes the necessary protective circuitry to hook up to the network without the use of a Data Access Arrangement (DAA) from the telephone company.



The Vadic VA317S modem has been approved by the FCC for direct connection to the switched telephone network via the jack-and-plug arrangement shown above.

The unit operates in automatic answer mode and is a direct replacement for the Bell System Model 113B, Vadic said. Up to 16 of the devices are housed in a 7-in. high chassis and the modem has analog and digital loop-back, as well as an 8-LED interface display unit and built-in data source for on-line testing, the firm said. It costs $240.

DAA Debuts

The DAAs to be introduced at the show include units compatible with the Bell models CDT, CBS and CBT. The units are available in stand-alone and rack-mounted models as well as card-only configurations. The automatic DAAs cost $100, the firm said from 505 East Middlefield Road, Mountain View, Calif. 94043.

Communications at NCC

Telcon Industries

DALLAS – The Datamax 6 communications processor from Telcon Industries, Inc. will be exhibited in Booth 1883.

The unit, available in wall-mounted and desk-top models, can have between 4K and 16K of memory and features data rates up to 4,800 bit/sec. The basic CPU is priced at $795, with options priced separately, the firm noted from Ft. Lauderdale, Fla. 33315.

Western Union Information Systems

DALLAS – Booths 1166 and 1168 will be the site for a demonstration of Western Union Information Systems' intelligent time division multiplexer, the System 4100.

Although announced last year, the unit has been enhanced so that it has high-level data link control (HDLC) and statistical multiplexing, the firm said, as well as the capability of combining asynchronous and synchronous traffic. The trunk line protocol used with the system provides for multinodal networks, and users can single-end the System 4100 by programming an intelligent front-end processor to carry out the multiplexing and demultiplexing functions, Western Union said.

Throughput can be up to 9,600 bit/sec in each direction simultaneously, the firm added, and the system can also terminate synchronous terminal lines with speeds up to 7,200 bit/sec and asynchronous lines with speeds up to 1,200 bit/sec.

The lines may be two- or four-wire, half- or full-duplex and use current loop, EIA or CCITT -V.24 terminations, the company said.

Control of the unit is handled by an 8-bit microprocessor which can address up to 64K bytes of read-only memory,

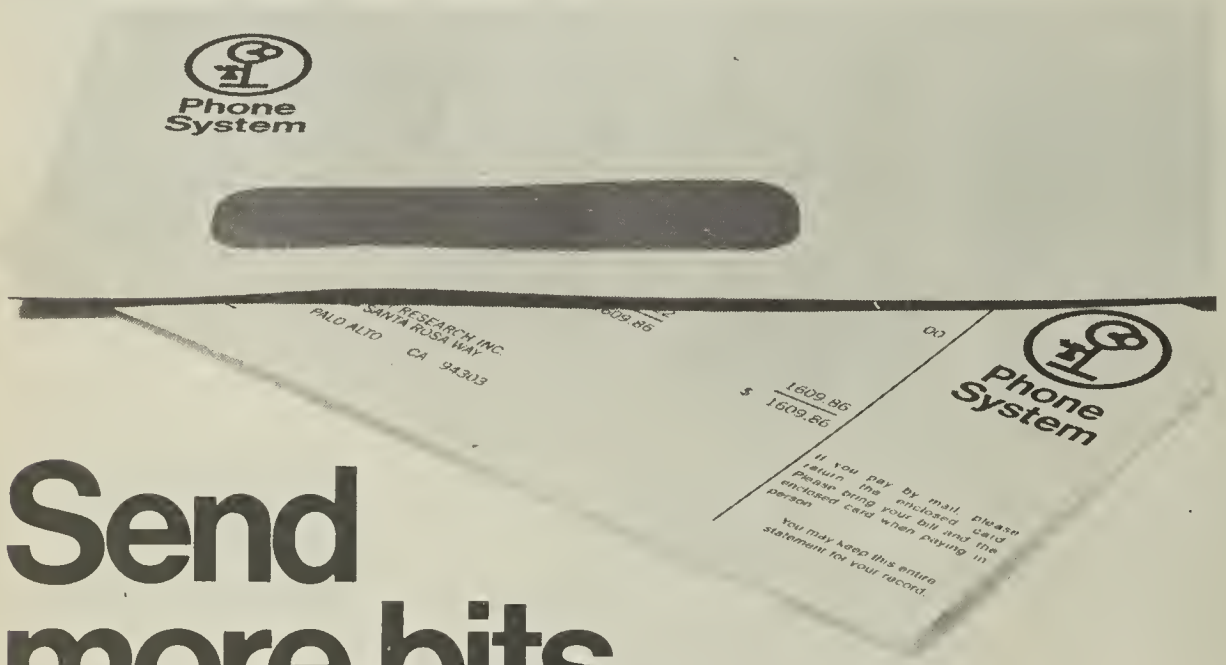
System 4100

programmable read-only memory or random-access memory with its 16-bit address lines. The instruction repertoire includes 72 variable length instructions, seven addressing modes, a variable length stack-in memory, vectored restart and maskable interrupt. Cycle time is 1 μsec and average instruction execution is from 2 μsec to 4 μsec, the firm claimed.

The unit is priced at $5,930 in a configuration that can support up to 16 lines.

In addition, Western Union Information Systems will also display its Data Set 4196, an LSI modem that provides transmission rates of 4,800-, 7,200- or 9,600 bit/sec, switch-selectable. Operation of the unit, which costs $6,500, is the full-duplex mode in synchronous bit serial form over a four-wire 3002-type channel, the firm said from 82 McKee Drive, Mahwah, N.J. 07430.

Beat the System.



Send more bits for less bucks.

Improve your data line system and save money.

A customer of ours recently cut his current phone bill by 35% and upped his transmission capacity by 260%. He did it by replacing a portion of his dial-up system with a leased line and several of our inexpensive Frequency Division Multiplexers (FDMs).

Our FDMs reduce costs by multiplexing several terminals over the same voice-grade line. They handle terminals operating at speeds ranging from 75 to 1200 bits per second. They can even intermix different speeds on the same line.

They operate over either two or four wire lines, and perform equally well in half or full duplex modes, or in a polled environment. Built-in diagnostics let you accurately evaluate your entire Telecommunications network.

Find out how to cut data transmission costs.

Our Money-Savers Information Packet includes an explanation of the ramifications of Bell's dial-up rate increases, several FDM case histories, a channel configurator chart to help you optimize your network, and an FDM data sheet.

Write or call for your packet.

PRENTICE

Prentice Corporation
795 San Antonio Road
Palo Alto, California 94303
415/494-7225
TWX 910 373 1239

Network Systems

DALLAS – Network Systems Corp., a first-time exhibitor at NCC, will display the Hyperbus and the Hyperchannel – two products designed to speed network communications.

Hyperbus provides a means to transfer data between devices over a single coaxial cable, according to a spokesman. Up to 64 minicomputers or terminals can be connected at distances up to 1,000 feet at 50M bit/sec and up to 1 mile at 1.5M bit/sec in multidrop fashion, he said.

Hyperchannel is a universal channel interconnect for host computers, storage subsystems and I/O subsystems, the spokesman stated. Implementation is accomplished using serial data transmission and buffering over a single coaxial cable.

It allows data channels to operate at their optimum rates, unlimited by the rates of attached devices, he said.

The Hyperbus costs about $5,000. The Hyperchannel costs $25,000 for each adapter, which includes 4K bytes of memory plus one trunk board.

Both units can be viewed at Booth 1178. Network Systems is at 6820 Shingle Creek Parkway, Brooklyn Center, Minn. 55430.

International Power

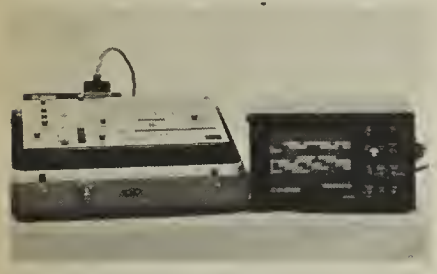
DALLAS – Three sizes of uninterruptible power systems will be shown by International Power Machines Corp. in Booths 1626 and 1628. The firm is based at 3328 Executive Blvd., Mesquite, Texas 75149.

Communications at NCC

Atlantic Research

DALLAS – Atlantic Research Corp.'s Booth's 1067 and 1069 will be dedicated to a display of the Intershake II data communication test unit and its companion Interview CRT unit. It will also include the Data Tech 9600, the NCS-100 tech control system and the firm's data transmission patching equipment.

The Intershake II can handle codes and line disciplines at speeds up to 64 kbit/sec with internal clock and up to 256 kbit/sec-sec with external clock, the firm said. It provides for half- and full-duplex testing, including provisions for display and for calculating the block check character for transmit and receive data of bisynchronous and Synchronous Data Link Control among others.



Intershake/Interview

The Interview is used for displaying data communications transmissions and can provide the operator with a display of all data traffic or only traffic from a selected terminal or location. The unit permits visual observation of up to 1K characters in either test, hex or octal for isolation of hardware or software faults in a communications system.

The Data Tech 9600 has the capability to exercise terminals, test modems and transmission facilities and to verify data character formats, the company said, while the NCS-100 network control system provides access at the interface points between the common carrier, modem and terminal equipment.

It gives the operator the chance to test individual lines and network modules for fault isolation, the firm added from 5390 Cherokee Ave., Alexandria, Va. 22314.

Digi-Log Systems

DALLAS — In Booths 1700 and 1701 Digi-Log Systems, Inc. will introduce a diagnostic tool that lets users monitor data lines in an unattended mode and store up to 1M characters, the firm said.

Priced at $3,500, the Tapetrap is an enhancement to the firm's DLM II data line monitor. The operator can set the monitor to record 250K characters and stop, record 1M characters and stop, or record continuously in an endless loop.

A trap sequence of up to 16 characters can be entered via an integral keyboard and the user programmed sequence can be used to either start tape recording or stop recording upon detection. In either case, special flags are placed on the tape at the point where the match took place. Digi-Log is at Babylon Road, Horsham, Pa. 19044.

MI² Corp.

DALLAS – An acoustic coupler, data set and complete terminal system will be the featured attractions in Booth 1583 by MI² Corp. during next week's NCC.

The Design 76/4 coupler family contains four different models for applications up to 300 bit/sec. The coupler is available in originate-only models and originate and answer models. An option allows either model to be used as a direct-access data set. The units are priced at $310.

The Design 100 data set is for applications up to 300 bit/sec and is designed to interface terminals to the TWX data network and the DDD switched telephone network. Priced at $495, the unit is available in several control panel configurations.

The Design 2400 KSR/T terminal is a 1,200 bit/sec switchable half- or full-duplex asynchronous printer terminal, according to the firm.

The programmable protocol interface board with the terminal incorporates an Intel 8080 microprocessor which can be programmed either in the factory or by the user for multiterminal demands.

The terminal sells for $3,595 from the firm at 1212 Kinnear Road, Columbus, Ohio 43212.

Design 100 Data Set

Our line.

Minis at NCC

Perkin-Elmer Data Systems

DALLAS – A total of 10 recently announced products can be seen for the first time at NCC when Perkin-Elmer Data Systems brings three of its divisions into one exhibit in Booth 1483.

Featured will be minicomputers from Interdata, disk and tape drives from Wangco and CRT and printer terminals from the Terminals Division.

Interdata will demonstrate the Model 5/16 for the first time. The single-board mini, to be shown here in a floppy disk configuration, features 16 general-purpose registers, direct addressing to 64K bytes of memory and vectored interrupts. The 256K-byte disk drive is the first floppy disk drive to be used by Interdata for its line of 16-bit minis.

In addition, Interdata will show an 8/16 system with 2.5M-byte disk and 30 char./sec printer; a 7/32 32-bit mini with 256K bytes of memory, two 300M-byte disk, two 75 in./sec, 1,600 bit/in. tape drives and a 600 line/min printer; and an 8/32 scientific system operating in Fortran VI with 500K bytes of memory and two 80M byte disk drives.

The Wangco unit will be displaying six products for the first time, including a 125 in./sec magnetic tape drive, the Model 14, which provides automatic loading and standard 800 or 1,600 bit/in. densities; an embedded formatter for tape drives with 800 or 1,600 bit/in. dual density; and the Model 82 microfloppy disk drive with up to 498.8K bytes of unformatted data capacity in its maximum single-drive configuration.

Other first time products include the Model 8200 microfloppy controller, which is an intelligent controller for the Model 82; the model 87 dual diskette drive system which comes in a standard package including two drives and controller formatter, although up to four drives can be daisy chained for 1M byte capacity; and a family of tape and disk controllers for the Digital Equipment Corp. PDP-11 and Data General Nova minis.

Additional Wangco products on exhibit include the Model 76 400K-byte standard floppy disk; the Super F, an IBM 2315-type front loading 10M-byte disk drive; and a range of tape drives from 37.5 in./sec to 75 in./sec.

The Terminals Division will be showing the Fox-1100 teletypewriter replacement CRT terminal with a 9 by 12 dot matrix, 96-character Ascii set, 24-line by 80-character display and a built-in microprocessor.

Interdata Minis

Headquarters for Perkin-Elmer Data Systems is 106 Apple St., Tinton Falls, N.J. 07724.

Computer Automation

DALLAS – Computer Automation, Inc. will exhibit products from all of its divisions in Booth 1465.

From the Commercial Systems Division will come a display of the Syfa distributed data processing system; the Industrial Products Division will show automatic test and simulation systems; and the Naked Mini Division plans a display of OEM minicomputers.

The Syfa system will be demonstrated with a network of 10 to 15 terminals, the firm said, and peripherals including two 10M-byte disk drives and two printers.

The Capable 400 line of computer-controlled logic circuit board testers will highlight the Industrial Products Division display, including units capable of analog and hybrid circuit board testing as well as the parametric testing of digital circuitry.

Also on display will be the 4000 logic simulation systems, which support the Capable testers by generating diagnostic test programs for the particular circuit board based on data coded from the logic diagram of the board, the firm said from 18651 Von Karman, Irvine, Calif. 92713.

Centronics

DALLAS – Centronics Data Computer Corp. will show its 6000 Series printers in Booths 1238 and 1244.

The line consists of 75-, 150-, 300- and 600 line/min printers and joins the company's 100, 300 and 500 Series of serial dot matrix printers for minicomputer and remote batch terminals, as well as small and medium-sized business systems, the firm said from headquarters in Hudson, N.H. 03051.

CFI 3336 Series Disk Packs
Largest product in the line, in both size and storage capacity. First disk pack to use servo track control. Available in two versions: Model 1–100 megabytes, Model 11–200 megabytes. Configurations available for CDC, Honeywell, NCR, DEC and Data General, among others.

CFI 1316 Series Disk Packs
The beginning of the line. Proven and field-tested. Designed for use with IBM 2311, Singer System 10 and CDC equipment, among others.

CFI 2316 Series Disk Packs
The most versatile product in the line. Available in many different sector configurations, data densities and track densities. Compatible with all major disk drives, including the Univac 8440.

Minis at NCC

Datapoint Corp.

DALLAS – Datapoint Corp. plans to use the NCC tto exhibit three new products from its location in Booth 1005.

The 6600 Advanced Business Processor has 120K of user memory, a 16-bit wide internal architecture and 600 nsec cycle speed. The unit is compatible with the rest of the firm's processors and offers multiply/divide and list handling instruction not available before, Datapoint claimed.

The 6600 comes with keyboard, video display and dual cassette tape decks and is designed for use with disk-based operating systems. Used as a host computer for the Datashare business time-sharing system, the unit can support up to 24 terminals.

Datapoint's DS41170 software, a diskette-based Datashare system, will also be demonstrated. DS41170 will support up to four ports on the Datapoint 1170 dispersed processor.

With DS41170, each user is allotted up to 4K of virtual memory for data area and 32K for program execution. Files are dynamically allocated among three diskette drives, with the fourth reserved for system files. Random-access, file-sequential and index-sequential access methods may be used in the creation and maintenance of these files.

The DS41170 interpreter will accommodate up to four user programs simultaneously, in any combination of local or remote functions. Real-time data communications may take place through one or more ports; batch data transmissions are possible with the utilization of Datapoint's batch emulator packages.

The Datapoint 1170 dispersed processor is equipped with a processor (5500-type) and user memory of 48K. It is available with two, three or four diskette drives.

The instruction set of the 1170 includes memory address indexing and basing capabilities, double-precision arithmetic, segmented and protected memory, 16 registers, multibyte I/O transfers and privileged instructions.

Datapoint is located at 9725 Datapoint Drive, San Antonio, Texas 78284.

Minicomputer Accessories

DALLAS – Minicomputer Accessories will occupy Booth 1818 with – what else? – a line of minicomputer accessories.

Included in the display by the firm, which sells most of its products by direct mail, will be such items as EIA extension cables that allow users to locate terminals further away from the mainframe; binders for keeping and storing floppy disks; file cabinets for floppies; and a specially designed stand to hold CRTs. Minicomputer Accessories is at 1015 Corporation Way, P.O. Box 10056, Palo Alto, Calif. 94303.

Kybe Corp.

DALLAS – Kybe Corp. will display its fully automatic SLT-80 computer tape cleaner/tester which opens the band, threads the tape and then cleans, tests and stacks it back onto the reel.

The system, which has a full cycle of 3-3/4 minutes, also reports the exact condition of the tapes, computer correlated at subcritical, nominal or hypercritical levels. It will be shown at Booths 1727 and 1729.

Three models are available for testing 9-channel formats at 1,600 bit/in., 6,250 bit/in. or both densities in combination. The SLT-80 is priced at $12,100 from Kybe at 132 Calvary St., Waltham, Mass. 012154.

International Computer Products

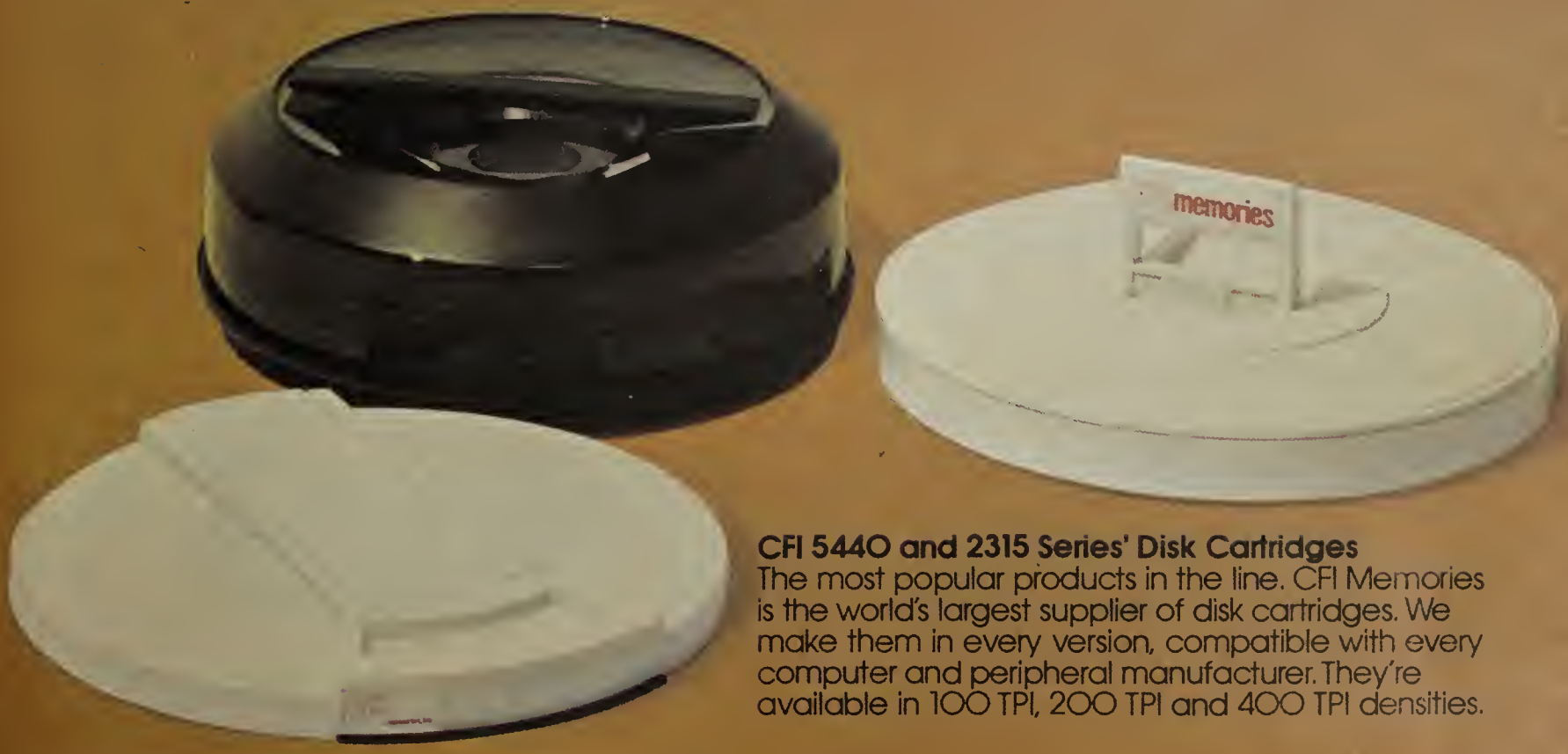
DALLAS – The International Computer Products, Inc. ICP 700 minicomputer and the firm's TD-1 diskette unit will be the highlight of the exhibit in Booth 1511.

The standard ICP 700 will support up to 10 CRTs, four disk drives and four printers and has 10 multiprogramming partitions, according to the firm. The unit has 16K to 256K of main memory and can accommodate up to 80M bytes of disk.

The TD-1 microcomputer is intended as a peripheral accessory for either on-site or remote data terminals and is equipped with from one to four standard IBM-compatible diskette devices with a capacity of up to nearly 1M bytes of storage, the firm said. The unit can communicate at rates from 50 bit/sec to 19.2 kbit/sec and prices begin at $3,495. ICP is at 2925 Merrell Road, Dallas, Texas 75229.

TD-1 Micro

CFI Trident Disk Packs/Storage Module
The newest products in the line. Uses 3336-11 particle-oriented disk. Available for use with all Trident-type drives having storage capacities of 25, 50 and 80 megabytes. Also available in storage module configurations for CDC and Hewlett/Packard type drives.



CFI 5440 and 2315 Series' Disk Cartridges
The most popular products in the line. CFI Memories is the world's largest supplier of disk cartridges. We make them in every version, compatible with every computer and peripheral manufacturer. They're available in 100 TPI, 200 TPI and 400 TPI densities.

OEMs at NCC

Monolithic Systems

DALLAS – A range of microcomputer memories will be displayed in Booths 1240, 1242 and 1244 by Monolithic Systems Corp.

The exhibit will feature the MSC 4502, displayed for the first time, which is a compatible memory for the Intel SBC 80 family of single board computers and Intellec MDS systems. The use of 16-pin sockets allows the random-access memory (RAM) section of the unit to be expanded in 4K increments up to 16K. Four erasable programmable read-only memory (Eprom) sockets can be accommodated on the same board with a maximum storage of 8K.

The unit provides 16 switch-selectable address start locations for RAM and 16 locations for Eprom. Distributed refresh time is 500 nsec on the system and read cycle time is 350 nsec, while write cycle time is 500 nsec. The unit is priced at $1,095 in single quantities.

The firm will also exhibit its line of DEC-compatible memories including add-on memories for the PDP-8, PDP-11 and LSI-11 computers as well as its Intel-compatible memories, the firm said from 14 Inverness Drive East, Englewood, Colo. 80110.

Vu-Data

DALLAS – Vu-Data Corp. will display its Model PS935/975 DMM-Counter-Mini-Scope in Booth 1624.

The test instrument has a dual trace scope; 50 MHz trigger range; 2 nsec sweep resolution; 35 MHz bandwidth and X-Y capability, the firm said from 7170 Convoy Court, San Diego, Calif. 92111.

Kennedy Co.

DALLAS – Booth 1785 will be used by Kennedy Co. to exhibit its Series 5300 disk drives, a line of fixed-cartridge, moving-head drives with a capacity of 70M bytes and a data rate of 1M byte/sec, according to the firm.

The unformatted capacities range from 14M bytes in the single-disk version up to the maximum 70M bytes in the three-disk model. Each surface has two 350 track/-in. cylinders with a recording density of 6,000 bit/in. Track-to-track head motion is 10 msec and average head movement time is 45 msec with a worst-case maximum of 80 msec. Average latency is 10 msec and the unit uses a modified frequency modulation recording technique implemented with emitter-coupled logic.

The Series 5300 prices range from $2,500 to $4,000 from the company at 540 W. Woodbury Road, Altadena, Calif. 91001.

BASF

DALLAS – BASF will show a mini floppy disk drive compatible with standard 5.25-in. flexible disk media in Booth 1795.

The Model 6106 is the first hardware product introduced in the U.S. by BASF.

The BASF 6106 is targeted for the OEM calculator, desk-top computer, terminal and word processing markets, the firm said.

Model 6106 Drive

Compact Size

The unit measures 5-3/4-in. in width, 3 in. in height and 7-1/2 in. in depth. It rotates mini diskettes at 300 revolution/-min and records at 2,581 bit/in. on 35 tracks. The tracking density is 48 track/-in. set up in up to 16 sectors. The unit allows up to 125K bits of data to be transferred per second at an average track-to-track access time of about 220 msec.

The 6106 drive consists of read/write and control electronics all contained on a printed circuit board, a drive mechanism, read/write head, a track positioning mechanism and the removable diskette, the firm said from Crosby Drive, Bedford, Mass. 01730.

Qantex

DALLAS – Tape and cartridge drives and other equipment will be displayed by Qantex Division of North Atlantic Industries, Inc. in Booths 1842 and 1844.

The range of equipment includes the 200 minidrive for miniaturized cartridges with up to 330,000 bytes of storage and priced at $250; the 650 drive with a capacity of 2.5M bytes using the 3M DC300A cartridge and priced at $300 in OEM quantities; the 86008 Ansi tape formatter priced at $570; and the 2400 cartridge storage system with 23M bytes capacity and a price of $2,520. The firm is at 200 Terminal Drive, Plainview, N.Y. 11803.

CFI Data Module
The most technically advanced product in the line. First to incorporate heads and carriage into the module. Available in three models. Model 35–35 million bytes; Model 70–70 million bytes; Model 70F–70 million bytes with fixed heads for rapid paging.

CFI Abraxas Diskettes
The first of our flexible-media line. We offer them both one-sided and two-sided and with various hard sector configurations. The entire recording surface of every diskette is certified 100% error-free. Compatible with IBM 3740 and other diskette drives.

CFI Abraxas V Digital Cassettes
A complete line of cassettes in various grades. Designed for use with most digital recording and word processing equipment.

CFI Abraxas Computer Tape
A top-of-the-line tape line. Available in most lengths and configurations and various reel sizes. Tested for use at 1600 BPI and 6250 BPI.

OEMs at NCC

Epic Data

DALLAS – Three programmable data collection terminals and two communications controllers will be available for inspection at Epic Data Corp.'s Booth 1057. The equipment is designed for use in factory data collection, inventory control and other similar applications.

The Model 1647-1 is an 8080 microprocessor-based terminal which electro-optically reads punched badges, displays times of day and provides five LED displays for prompting. The 1647-2 terminal additionally reads 80-column Ansi cards and includes 20 user-defined keys for inputting variable data. The 1647-3 provides 40 user-defined keys and 10 LED displays.

All the terminals may optionally receive data from magnetic striped badges and bar codes or directly from keystations. Other options include 10-digit numerical displays, 32-character alphanumeric displays, twisted pair line drivers, low-speed telephone system modem, serial asynchronous and synchronous communications ports and expandable read-only memories and random-access memories.

Control Unit

The Model 1648-1 control unit controls up to 30 terminals on one line, while the Model 1648-2 controls up to 100 terminals on four lines.

Prices for the equipment in quantities of 100 start at $995 for the 1647-1 terminal, $1,310 for the 1647-2, $1,455 for the 1647-3, $1,310 for the 1648-1 control unit and $1,615 for the 1648-2. Delivery is 45 days from the firm at 12728 15th Place N.E., Bellevue, Wash. 98005.

Interface Mechanisms

DALLAS – Bar code printers and readers will be shown in Booth 1845 by Interface Mechanisms, Inc.

The 8100 Series printers, which contain a microprocessor, are serial impact bar code printers designed for random input short runs. The Model 9210 features dual connectors to allow the unit to be attached in tandem with a CRT or on-line terminal; hand-held scanning from 3 in./sec to 50 in./sec; alphanumeric bar code reading, with variable messages up to 32 characters; half- or full-duplex operation; and RS-232 interface. The firm is at 5503 232nd St. S.W., Mountlake Terrace, Wash. 98043.

Data I/O

DALLAS – The Model 7 portable programmable read-only memory (Prom) programmer from Data I/O Corp. will be on display in Booths 1143 and 1145.

The unit is a universal Prom duplicator in its basic configuration, but with options is also capable of serial or parallel data communications in interchangeable data formats; remote control by teletypewriter, CRT terminal or computer; and emulation of over 200 Proms.

Model 7 Prom Programmer

It can be converted into a Model 9 programmer configuration, gaining hexadecimal keyboard, hex address and data displays, insert/delete data editing, error message readout and the ability to simultaneously access data from random-access memory (RAM), Prom and ROM emulators.

The 1K by 8-bit RAM with the basic unit is expandable in 1K increments, according to the firm at P.O. Box 308, 1297 N.W. Mall, Issaquah, Wash. 98027.

Wintek

DALLAS – Wintek Corp. will show its line of Wince Micro Module support hardware in Booth 1023, plus its Model B-R-B video terminal.

The support hardware includes such things as backplanes, card racks and power supplies, while the terminal has a 16 line by 80 character screen and operates in the scrolling mode. The characters are made up by a 5 by 7 dot matrix and the unit communicates in a bit serial asynchronous mode at standard speeds up to 9,600 bit/sec, the firm said from 902 N. Ninth St., Lafayette, Ind. 47904.

Rubber Urethanes

DALLAS – In Booth 2026 Rubber Urethanes Co. will show its line of rubber products, including capstans, feed rolls and drives for printers. The products are manufactured on a custom basis from customer blueprints, the firm said from 968 W. Foothill Blvd., P.O. Box 280, Azusa, Calif. 91702.

CFI Abraxas IV Magnetic Tape Cleaner
Keeps our tape line clean. Safe and effective. Removes contamination which can seriously affect the operational capabilities of magnetic tape.

CFI Abraxas III Disk Cartridge Cleaner-Verifier
To help maintain our line. Completely portable and self-contained unit cleans and mechanically tests both front and top loading cartridges. Prevents costly head crashes and reduces or eliminates soft errors caused by damaged or dirty disk cartridges.

OEMs at NCC

General Robotics

DALLAS – Booth 2073 will be used by General Robotics Corp. to display a central processor based on the Digital Equipment Corp. LSI-11 microcomputer module, the firm said.

The OEM CPU includes both an LSI-11 double-sized backplane and a PDP-11 Unibus adapter so it can be used as a direct replacement for any LSI-11 or PDP-11/03, according to the firm, and for some PDP-11/04 and PDP-11/05 minis.

The standard GRC11/X3 includes an extended instruction set, floating-point arithmetic, 20K words, extended memory addressing to 512K words, a serial I/O module with switch-selectable data rates, a Unibus peripheral port and eight additional module slots, the firm said. It is priced at $5,995.

As a packaged system with dual-drive, double-density DMA floppy disk and operating system with Fortran IV, the GRC11/FDX3 costs $11,995, according to the firm from 57 N. Main St., Hartford, Wis. 53207.

Sheldon-Sodeco

DALLAS – Sheldon-Sodeco, a Landis & GYR company, will be displaying its series of 15-column impact printers in Booth 1128.

Capable of printing at speeds up to 3 line/sec for numeric or 1.5 line/sec for alphanumeric data, the PR1500 printers have a 54-character set and feature line feed up to 10 line/sec and can be purchased for $165 in single quantities, the firm said from 4 Westchester Plaza, Elmsford, N.Y. 10523.

PR1500 Impact Printer

EMM

DALLAS – Electronic Memories and Magnetics will make the first showing of its Severe Environment Controller System – 11, Industrial in Booth 1493.

The industrial minicomputer uses Mil grade TTL medium-scale integrated devices and has been programmed to be compatible with and to emulate the Digital Equipment Corp. PDP-11/34 or PDP-11/45, the firm said from 20630 Plummer St., Chatsworth, Calif. 91311.

Micon Industries

DALLAS – A computer terminal selling for $400 which is said to be "ideal for communicating with a microprocessor" will be displayed in Booth 1352 by Micon Industries.

The KDM/1 includes a full Ascii keyboard, 32-character alphanumeric LED display, AC power supply and RS-232 interface. Options include an acoustic coupler, mini-cassette tape unit and additional display capacity up to 1,920 characters.

The terminal operates at rates of up to 9,600 bit/sec.

Micon is located at 252 Oak St., Oakland, Calif. 94607.

Mag-Tek

DALLAS – Mag-Tek, Inc. will use Booth 1719 to show its line of magnetic stripe reading and encoding equipment for point-of-sale, factory data collection, automatic gas dispensing and access control systems.

The single unit price of the systems begins at $140, according to Mag-Tek at 20725 S. Annalee Ave., Carson, Calif. 90746.

Lipps

DALLAS – A 20-track, 1/2-in. digital read/write head, which costs about $350, will be one of a whole line of digital magnetic recording heads shown by Lipps, Inc. in Booth 1668. These heads feature an increased number of tracks per given tape width, the firm noted. Lipps is at 1630 Euclid St., Santa Monica, Calif. 90404.

Mag-Tek Reader

We take your business personally
We have made a major commitment to R&D and to the continuous refinement of the manufacturing process. We will continue to develop technologically advanced products for both the end-user and OEM.

We have also made a major commitment to a nationwide network of independent representatives. The men who sell and service our line have proven themselves to be the best in their field. That's why they represent CFI. They work hard to earn your business by giving you the kind of personal attention and professional service you just can't get any place else.

A nearby CFI representative is waiting to show you how you can get all the care and quality we put into our products and all the personal attention you could ever want at prices your accountant will appreciate. And that's really the bottom line.

Call us toll-free for the name of your local representative: 800/854-3290. Or write: CFI Memories, Inc., 305 Crescent Way, Anaheim, CA 92801.

CFImemories, inc.

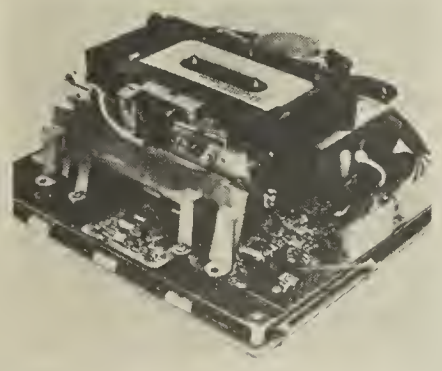
OEMs at NCC

Triple I

DALLAS – The STR-150 tape drive system providing remote signal control of transport functions will be shown in Booth 2015 by Triple I, Inc., which will also display a cassette transport evaluation package.

The STR-150 includes read/write electronics, control and timing logic and motor control logic and is designed for mini and microcomputer systems, the firm said. It accepts any asynchronous 8-bit parallel data word and records in a self-clocked serial mode.

The Phi-Deck cassette transport evaluation packages provide building blocks for digital or analog cassette systems and include a Phi-Deck transport, motion control board, remote control box, power supply, connecting hardware and various sensing and status options. Triple I is located at 4605 N. Stiles, Oklahoma City, Okla. 73118.



STR-150 Tape Drive

Innovative Electronic Systems

DALLAS – The C-40 from Innovative Electronic Systems is an interface conversion board that converts the Teletype Model 40 SSI interface to that of a Centronics Corp. printer and will be displayed in Booth 1781. The unit mounts inside the Model 40 cabinet underneath the printer mechanism and costs $795 in single quantities, the firm said from 5951 N.W. 151 St., Miami Lakes, Fla. 33014.

GNT Automatic

DALLAS – GNT Automatic, Inc. will introduce its Model 27 1,500 char./sec paper tape reader spooler. Also on display in Booth 1176 will be GNT's line of paper tape punches and associated interfaces. The Model 27 is priced at $1,495 from the firm at 440 Totten Pond Road, Waltham, Mass. 02154.

Okidata Corp.

DALLAS – Okidata Corp. will use Booth 1533 to show a family of disk drives that provides up to 74M bytes of memory in a 7-in. rack with prices beginning at $46 per 1M bytes.

The 3300 Series comprises six models of moving-head, fixed-disk drives which range in capacity from 12.4M to 74.4M bytes. Two models of fixed-head-only provide capacities of 2.97M and 5.94M bytes. Fixed heads can also be added to moving-head models to a maximum of 2.2M bytes. The fixed heads have an average access time of 10.1 msec and can be accessed while positioning the moving heads.

Drive Feature

The drives feature a rotary positioner, IBM 3340 Winchester-type heads and media.

Features of the Okidata 3300 disk drive family include a rotary positioner with a 10 msec track-to-track seek and 38 msec average access time, a 7.33M-byte data transfer rate, 18,560 byte/track, two moving heads per disk surface and 339 addressable cylinders.

Okidata is located at 111 Gaither Drive, Mt. Laurel, N.J. 08054.

Magnusonic Devices

DALLAS – Magnusonic Devices, Inc. will fill Booth 1725 with magnetic tape and disk heads.

The firm will feature IBM-compatible 7- and 9-track heads; magnetic disk heads, including 2314-type (100 track/in. and 200 track/in., 2,200 bit/in. and 4,400 bit/in.) and 3330-type with 192 track/in. and 370 track/in.; and Winchester-type heads.

In addition, floppy disk heads and cassette and cartridge heads will be displayed by Magnusonic Devices, located at 290 Duffy Ave., Hicksville, N.Y. 11801.

Nortronics

DALLAS – Nortronics Co., Inc. will display its line of magnetic heads in Booth 1266. The line includes 1/2-in. 6,250 bit/in. heads capable of 75 in./sec to 200 in./sec; .15 in. cassette heads; floppy disk heads with IBM compatibility; magnetic credit card heads; ledger card and merchandise tag heads; and thrift and passbook heads.

Nortronics is located at 8101 Tenth Ave. N., Minneapolis, Minn. 55427.

Your line.
800/854-3290
(In California 714/776-8571)
Rep Inquiries Invited
See us at our Dallas hospitality suite.
CFI memories, inc.

Peripherals at NCC

T-Bar, Inc.

DALLAS – T-Bar, Inc.'s line of peripheral switching equipment for both mainframes and minicomputers will occupy Booths 1811, 1813 and 1815.

Each switcher is compatible with a specific computer, but they share certain common features such as the capability to switch peripherals to reconfigure systems, the firm said. All of the units are suitable for remote control, T-Bar added from 141 Danbury Road, Wilton, Conn. 06897.

California Computer Products

DALLAS – An interactive graphics terminal, an on-line plotter controller and a quad-density floppy disk drive head the list of new products to be shown in Booth 1233 by California Computer Products, Inc.

The terminal will be demonstrated in its basic configuration which consists of a processor, display screen, RS-232C interface and Ascii keyboard. Supporting software will also be demonstrated.

The on-line plotter controller, designed as an intelligent interface between specified Calcomp plotters and a wide spectrum of computers and calculators, is adaptable to either local or remote operations, Calcomp noted.

The controller can convert computer output in both serial and parallel formats, with an undedicated parallel input port available for specialized inputs.

Also to be shown will be a new expanded capability, off-line controller, the Model 921.

Among floppy disk products exhibited will be a Model 143M two-sided, double-density multifunction drive and a Model 1143 floppy disk controller.

With an unformatted capacity of 12.8M bits, the 143M has a flat head design for ruggedness, compactness and durability, the company said.

For direct memory access or RS-232 interface, the 1143M floppy disk controller can be used to control as many as four 143M drives, containing up to 16.4M bits of IBM 3740/3600 compatibly formatted data.

In large disk memory products, the company's exhibit will include the entire Calcomp line of Trident disk drives, in unit capacities from 25M bytes to 300M bytes, the firm said from 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Check It Out For Yourself

	TLMS Release 4	Other
On-line updating and inquiry	Yes	
Alternate logging capability	Yes	
Protection of scratch and non-scratch status	Yes	
Audit and inventory reports	Yes	
Console sharing for multiple CPU's	Yes	
Automatic scratching of tapes	Yes	
Simple interface to OS	Yes	
Scheduling and control of tapes being moved to off-site location	Yes	
Automotic uncataloging of scratch tapes	Yes	
Non-quiesing of tape jobs while backing up the moster	Yes	
Unchanged JCL for users	Yes	
Non-degradation of system performance	Yes	

PLUS — On-site training and installation — at no extra charge

What You Want From A Tape Library System — You Get From TLMS Release 4.

When you want an easier way to do a tougher job.

For more information, write or call:
Gulf Computer Sciences, Inc.
1775 St. James Place
Suite 160
Houston, Texas 77056
Tele. (713) 627-9320

Member SIA Software Industry Association

Imlac Corp.

DALLAS – Imlac Corp. will show its PDS-1G and PDS-4 interactive graphic display systems in Booth 1581.

The programmable minicomputer systems can operate either as remote terminals or as free-standing graphics systems

Imlac PDS-4

and include a CRT monitor, keyboard, serial asynchronous interface and 16-bit word main memory shared by the mini and the display processors, the firm said.

Options to be shown include light pens, data tablets, joy sticks, color monitors, graphic hard-copy devices and both removable cartridge-type and floppy disk systems. Prices start at $18,000 and delivery is 90 days from the firm at 150 A St., Needham Heights, Mass. 02194.

Summagraphics

DALLAS – Summagraphics Corp., a supplier of data tablets and digitizers, will unveil a programmable microprocessor-based digitizer, which allows the user to preprocess data. This digitizer, on display at Booth 1170, features an 8080 microprocessor, plus custom firmware such as relocatable origin, binary/BCD conversion, metric output, incremental operation, scaling, rotational correction, area calculation, distance measurement and angle calculation.

Program call-up and parameter entry are accomplished by touching a hand-held stylus or cursor to a programmed menu pad on the digitizer itself. In addition, a system display panel exhibits X-Y values, computational results and current operating mode.

The unit ranges in price from $2,400 to $6,000. Summagraphics is located at 35 Brentwood Ave., Box 781, Fairfield, Conn. 06430.

When we won this award, 1,000 DP managers shared the spotlight.

Johnson Systems accepted the award, but we know where the credit is due.

We thank the 1000 DP Managers whose confidence and support resulted in this recognition.

Only a few software products have ever attained such world-wide acceptance.

We have noticed that the other trendsetters have a lot in common with us.

They are all technically sound, easy to install, easy to use, easy to understand, easy to maintain, and above all, they work like they should.

We realize our responsibility to all present and future customers. To meet their increasingly complex requirements, we are dedicated to continual product enhancement.

If you are not yet a customer, we invite you to investigate seriously our remarkable package. Clip and mail the coupon today and we'll send you the facts about Johnson Systems' **Job Accounting Report System.**

Johnson Systems, Inc.
8400 Westpark Drive
McLean, Virginia 22101
(703) 893-8700

SUPPORTS: **MVS—SVS—VS1—DOS/VS—POWER/VS—MVT—MFT— CICS/VS—IMS/VS—HASP**

C66

Tell us what areas you're interested in!

☐ Job Accounting ☐ Budget Control ☐ Resource Utilization
☐ Cost Distribution ☐ Thruput ☐ Programmer Efficiency
☐ Software Performance ☐ Customer Billing ☐ Job Scheduling

Send for your FREE 30 page System Characteristics Manual

Name _____

Title _____

Company _____

Address _____ City _____

State _____ Zip _____ Phone (___) _____

Computer _____ Operating System _____

Peripherals at NCC

Key Tronic Corp.

DALLAS – Key Tronic Corp. will introduce its Datareader, described as a low-cost OCR system, in Booths 1354 and 1356. Designed for use with the Key Tronic M9 electronics module, the Datareader uses a microprocessor for multi-font character recognition.

One feature is a high-level character resolution, which refers to the grade print quality as defined by the Ansi code standards, Key Tronic said. As a further enhancement, the company added, the sensitivity adjustments that are located on the front panel allow the operator to fine tune or even detune the recognition circuits, thereby expanding the range of character recognition.

The read heads in the Datareader have a vertical adjustment to accommodate a variation in form sizes ranging from a minimum of 1 in. in height by 2-1/2 in. in length to a maximum of 6 in. in height by 8-3/4 in. in length.

The unit can read and process up to 3,900 document/hour in a variety of fonts including OCR-A numeric, OCR-A alphanumeric, Farrington 7B, Farrington 12F, Micr print, handprint, OCR-B, 407, 1428 and a variety of subsets in the OCR-A numeric, OCR-B and handprint selections, the firm said.

In addition, the auto feed mechanism has an adjustment for document thickness to ensure single document selection and a document thickness control knob located on the front of the unit allows the operator to set up the feeder mechanism for the particular weight of document being processed. The multi-document detector shuts down the transport automatically if the document thickness control has not been set correctly.

Additional Features

Other features, such as a singular dual-line read which is standard with each transport, allows two lines of data to be read by attaching a second transport mechanism. Dual read heads can be handled by a single M9 electronics module. Selective data fields under control from the M9 electronics read head will recognize or ignore selected blocks of data in the scan path, the company said.

Prices range from $19,000 to $30,000, depending upon configuration, interface and fonts required. Key Tronic is in Building 14, Spokane Industrial Park, Spokane, Wash. 99216.

Texas Digital Systems

DALLAS – Booth 2075 will be the place Texas Digital Systems, Inc. will show a new model in its line of tape message display systems.

The units provide a message display at each tape drive, disk drive or printer to tell operators which tapes or disks need to be mounted or dismounted at any time.

The units feature up to 256 individually addressable displays; local and remote operation; a top-mounted signal light that flashes to indicate the need for operator intervention; a 64-character alphanumeric character set for volume serial numbers, data set names and special messages; and Display Support System software for IBM users.

The unit operates through the communications control unit as a standard peripheral and can operate with shared drives and multiple CPUs, the firm said. The software is said to operate with all major IBM operating systems, establishing communication linkages and automatically displaying mount, dismount and status messages.

Previously the system was available with a 16-character display and the new model will have a 20-character plasma display.

Texas Digital can be reached at P.O. box 3701, Bryan, Texas 77801.

MDB Systems

DALLAS – Booth 1081 will be the showcase for MDB Systems, Inc.'s set of line printer controllers.

The highlight of the exhibit will be the latest addition to the MDB line, the HP 2100 controller designed to interface Hewlett-Packard's HP 2100 to most printer models of Centronics, Data Products, Data 100 and Data Printer, as well as the Digital Equipment LA180. Line printers such as Printonix, Tally, Diablo 2300 and others which emulate the Centronics or Data Products printers are also compatible with the MDB controller.

Transparent to Host

Transparent to the host computer, the controller is a single printed circuit board requiring one slot in the HP chassis; a 15-foot cable is supplied.

Prices for the controller range from $850 to $1,250, depending on the line printer model selected.

Other MDB controllers for the same selection of printers are available for the DEC PDP-11 and PDP-8, DEC LSI-11 microcomputer, Data General Nova and Interdata computers.

MDB Systems is located at 1995 N. Batavia St., Orange, Calif. 92665.

At BDS, we're supplying two alternatives to your standard line printer systems. Our products are centered around the DataProducts Model 2470 and 2550 CHARABAND printers.

Our B-70 Model is one that you're probably already familiar with - - - Burroughs calls it the B9246. It's a high-speed 1500 - 1800 LPM drum printer.

The BDS B-50 Model is the latest in horizontally moving font devices offering the user superb print quality with two character sets standard.

Even better is that our BDS line printer systems can operate with most Burroughs mainframes from the B1700 series through the B6700 series. You provide the imbedded Burroughs buffered controller and cables and the BDS B50 or B70 system will plug directly into your cable end. It's that simple! We also provide 300/600 or 900 LPM alternatives.

To top off a great line, we can give you a great deal: Both our BDS B50 and our BDS B70 sell for only $32,000 each. We can provide maintenance agreements in over 50 U.S. cities coast-to-coast. And we deliver in 30-50 days!

So, if you're considering a new system, or a replacement give us a call – San Francisco: (415) 326-2115, in Los Angeles: (213) 887-5240. Manufacturers Representatives Inquiries Invited.

The Alternative to Burroughs

Reduce costs and improve line printer throughput

BDS

BDS Computer Corporation
525 University Avenue
Palo Alto, California 94301

The computer system I use is _____
My Line Printer requirements are _____
_____
Name _____ Title _____
Company _____
Address _____
City _____ State ____ Zip _____
Telephone _____

Peripherals at NCC

Vector General

DALLAS – Vector General will show its 3300 series of interactive graphics displays in Booth 1115. The units are capable of providing refresh graphics for minicomputers with standard I/O configurations at writing speeds up to 16,667 short vectors and 6,000 characters.

Two models of these direct writing displays are offered: Model 3301, which displays two-dimensional graphics and alphanumerics and the Model 3302, which adds image transformation and rotation capabilities to the basic 3301.

These microprogrammed units feature 2D digital transformations, variable-speed vector and font generators, programmable graphic instructions, font transformations, optional refresh buffer and subroutine stack capability.

Series 3300

The 3300 models contain a microprocessor display I/O control unit which accepts 16-bit data and controls and front ends the display generation hardware. This unit is oriented to list interpretation, using either the host minicomputer or optional internal buffer for image refresh.

Other hardware features include 256 programmable intensity levels, four vector modes, six line textures, hardware blinking and 4K by 4K addressable locations.

Input devices include data tablet, alphanumeric keyboards, joystick, 16 or 32 function switches, control dials and light pen.

Vector General at 21300 Oxnard St., Woodland Hills, Calif. 91364.

Sykes Datatronics

DALLAS – The Comm-Stor communications diskette unit will be highlighted at Booths 1722, 1724 and 1726 by Sykes Datatronics, Inc.

The unit, featuring an RS-232-compatible interface, can be connected to any asynchronous terminal, printer or modem, the firm said, adding the unit is built around a microprocessor that uses a message-oriented directory for storing and retrieving data.

Comm-Stor will also handle the label and data conversions (Ascii to Ebcdic) required to prepare IBM 3740-compatible diskettes on an Ascii terminal.

The device can operate at speeds up to 9,600 bit/sec. Prices start at about $1,500 for a single-drive unit and at about $2,100 for a dual-drive unit, the firm said from 375 Orchard St., Rochester, N.Y. 14606.

EMM

DALLAS – Add-on memories for the IBM 370/158 and 168 will be spotlighted in Booth 1493 by Electronic Memories & Magnetics Corp.

The units feature Standby Memory and include 64K bytes (in four 16K-byte segments) of semiconductor memory and main storage protection when double bit errors occur in one of four locations, the firm said. In addition, the units feature deferred maintenance capability that allows the operator to either automatically replace or reconfigure any failed segment of memory by a single switch setting, the company added from 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.

Diva, Inc.

DALLAS – Diva, Inc. will show its DD-40 and DD-50 series of disk systems for a range of minicomputers at Booth 2012.

The DD-40 systems come in versions for the Digital Equipment Corp. PDP-11, Interdata and Data General minicomputers. Each contains between 100M- and 300M bytes with a transfer rate of 806- to 1,209 kbyte/-sec and an average access time of 10 msec track-to-track.

The comptroller V controller provides error correction and microprocessor technology; it can connect up to eight spindles.

The DD-50 also uses that controller and is available for DEC, DG and Interdata machines in 25.7M-, 54.7M- and 82.1M-byte capacities unformatted, the firm said from 607 Industrial Way West, Eatontown, N.J. 07724.

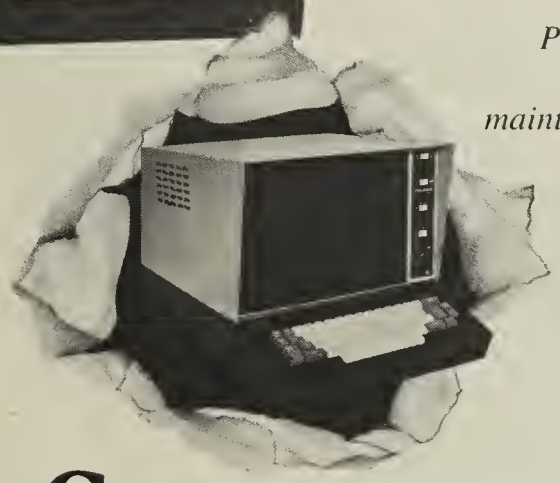
Lean on it or Love it!

Teleray... the Thick-Skinned Terminal for Everybody...

Solid metal cabinet! Built to "take it" in factory or office. No fan! Exceptional reliability! People-designed to be *used!* There's a Teleray model for just about everybody!

UL-APPROVED!

Plug-in chip maintainability



Superay

Microprocessor-based CRT

Block, message, line, or character transmission. Multi-page buffering (up to 8 pages of 1920 characters). Line and character insert and delete. Protected format. Dual intensity, blink, inverse field attributes. Full cursor control. Six erase functions. X-Y addressing and read. Data compression. Parity checking. Loads of other standard features for which you'd expect to pay optional prices.

Teledisk

Microprocessor-based Mini-floppy.

Microprocessor-based mini-floppy uses new 5¼" mini-disks. Works with CRT or printer terminals for low-cost data storage, off-line editing, and fast-line communication. Two RS-232 interfaces. Reliable, fast, random access of data. Read, record, erase, find, insert operations.

See them both at NCC-Booths 1847-49-51.

Teleray DIVISION OF RESEARCH INC

BOX 24064 MINNEAPOLIS, MINNESOTA USA 55424

Peripherals at NCC

Tab Products Co.

DALLAS – Booths 1222, 1224, 1226 and 1228 will be the home for a display of the Model 501 card-oriented terminal and the diskette-based System 700 from Tab Products Co.

The 501 punches, prints, interprets, verifies and corrects, the firm said, noting it is microprocessor-controlled and has a buffered memory.

Includes Micro

Built around a microprocessor, the System 700 combines IBM 3740 compatibility with a variety of configurations from a single-station model to a dual-station model and such options as a card I/O terminal and line printer.

The firm will also display its accessory products including the Dataguard safe for storing magnetic media, the Hang II tape storage system, the Data Media storage system for tapes and the line of CRT display desks, the firm said from 2690 Hanover St., Palo Alto, Calif. 94304.

Gould, Inc.

DALLAS – Gould Inc.'s Instrument Systems Division will show a remote graphics processor (RGP) that gives remote terminals the capability of generating graphic hard copy when coupled with a Gould 5000 Series electrostatic printer/plotter.

With either a remote job entry or batch type terminal, the Gould processor – shown in Booth 1015 – prints charts, graphs and engineering drawings at paper speeds averaging 1/2-in./sec, when the serial data rate is 9,600 bit/sec. Actual paper speed varies from .04- to 1 in./sec, depending on the plotter model, the rate at which data is received and the plot.

Using Gould's Plot graphics software and RGP option software on the host computer, input data is processed and transmitted over the communication line in an encoded character form. The RGP data can, therefore, be handled by standard host computer spooling software without modification, the firm said.

Using an RS-232C interface connection to the terminal, the RGP processes the transmitted graphic data and sends raster data to the Gould plotter.

Software is available for host computers of the following types: IBM 360/370, Univac 1100 Series and Control Data Corp. 6000, 7000 or Cyber 70 Series.

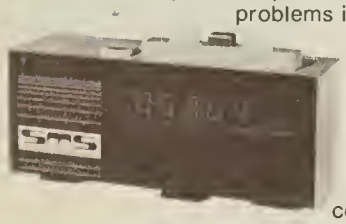
An optional hardware character generator is available to provide alphanumeric printer/plotter output for most terminal configurations using Ascii format, Gould said from 3631 Perkins Ave., Cleveland, Ohio 44114.

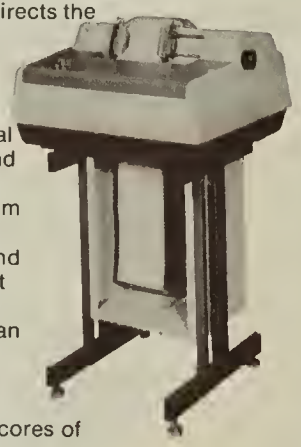
from Scientific Measurement Systems

peripheral control products & systems

A must for anyone who uses peripherals

■ Simply using peripherals, rather than cost effectively getting the most from those devices, might just be the difference between a good data processing installation, and a superior one. ■That's where SMS peripheral control products & systems come in. ■ This proven family of minicomputer-based products provides practical and cost-justifiable solutions to the tape- and disk-handling problems in the computer room. To help you get the most out of—and into, for that matter—your IBM System/360 or 370, Sperry Univac 1100 Series, or Honeywell Series 6000 computer systems. ■ There's the **Tape Mounting Display and Control System** that analyzes all computer-generated operator messages, alerts the operator to where the action is, and directs the specific action necessary to service the outstanding request. And does it with a color-coded three-light indicator and an eight-position alphanumeric display combined in one compact unit, mounted directly on the tape drive. ■ The **on-line Tape Label Printer** that automatically generates external labels whenever a dismount message occurs for a newly created output tape, and eliminates tape posting mistakes. And the **on-line Status Display** that provides, at a glance, an overall picture of computer peripheral activity to help you get optimum performance from these devices. ■ Newest product from SMS is an innovative **Peripheral Information Control System,** an on-line, real-time monitoring, display and reporting system that provides an instant "snapshot" of the activities and current status of all your I/O and storage peripherals, so that you can have the information you need—instantly—to make the decisions that can improve peripheral and personnel performance in your computer center. ■ In an industry where the name of the game is control, Scientific Measurement Systems demonstrates why it is a leader. Proven by scores of companies who look to us to help them get the most for their data processing dollar. ■ Why don't you take a firsthand look for yourself? Call Gerry Lavine at 609-424-5220 today to arrange for a visit to one of our customer sites.





See us at the NCC—Booth 1171-1173

SMS Scientific Measurement Systems, Inc.
An Inductotherm Company • 26 Olney Avenue, Cherry Hill, NJ 08003

I'd like to look into your peripheral control products and systems.
☐ Please contact me to arrange an appointment and demonstration.
☐ Please send more information, including a reprint of a published article detailing how you helped the Social Security Administration save $1 million a year.
☐ Mounting Display and Control System
☐ Status Display
☐ Label Printer
☐ Peripheral Information Control System

Name _____
Title _____ Phone _____
Company _____
Address _____
City _____ State _____ Zip _____

Information Terminals Corp.

DALLAS – Information Terminals Corp. (ITC) will bring its entire line of removable magnetic storage devices, featuring the Verbatim recording media.

Verbatim is a formulation of ferric oxides in macromolecular binder system that adheres it to the tough polyester film, a spokesman explained. It is used on ITC's floppy disks, magnetic cards, digital tape cassettes and 1/4-in. cartridges.

The Verbatim media is also used on ITC's MD 525, a flexible minidisk which is about half the size of a standard floppy disk and provides one-third the storage capacity. It is priced at $5.25.

All Verbatim devices are guaranteed error-free and can be seen in Booths 1032 and 1034. ITC is located at 323 Soquel Way, P.O. Box 9077, Sunnyvale, Calif. 94086.

Victor Comptometer

DALLAS – Victor Comptometer Corp. will be showing its stand-alone 5000 Series of alphanumeric printers for label and ticket printing in Booths 1771, 1773, 1775 and 1777.

Each unit is equipped with a microprocessor controller and a double line buffer for incoming data leading to a data rate of up to 9,600 bit/sec. The Ascii inputs are parallel for the Model 5012-463, RS-232 for the Model 5011-463 and current loop for the Model 5012-463.

The company is at 3900 N. Rockwell St., Chicago, Ill. 60018.

Victor 5000 Series

Peripherals at NCC

Tally Corp.

DALLAS – Booth 1283 will be the site for a display of a family of matrix line printers with speeds of 375- and 500 line/min from Tally Corp.

The T-5000 series features a 9 by 7 half-space matrix font, full-line buffering, a 64-character set, 11 in./sec slew speed, scroll ribbon, 132 printer positions at 10 char./in., 6 line/in. spacing, dual adjustable tractors and 0 to 99 line forms length, the firm said.

The units use the helix printing principle with 22 voice coil activated hammers and all printer functions are controlled by an integral microprocessor.

Interface Controlled

The unit also offers a selection of interface controllers for various minicomputer and for emulation of other printers. Options include a 9 by 9 half-space font, double 96-character set, compressed printing, self-test, 8-channel tape and 6- or 8 line/in. spacing, plus special character sets. Prices for the system start at $6,950, the firm said from 8301 S. 180th St., Kent, Wash. 98031.

Applicon

DALLAS – A system for producing color hard copies based on a three-color ink jet plotter will be demonstrated in Booth 2042 by Applicon, Inc.

The color plotter uses three ink jets in the primary colors (red, yellow, blue) to print on paper, overhead transparency film and other media, the firm said.

The minimum time for a full-size (22 in. by 34 in.) plot is 8-1/2 min, the company said, adding that the resolution is 5 point/mm or 127 point/in.

15,000 Shades

Over 15,000 color shades are provided under software control, and the unit has a set of Fortran subroutines for making charts and maps as well as handling direct input from raster scanners.

The basic unit is priced at $39,500. Applicon is at 154 Middlesex Turnpike, Burlington, Mass. 01803.

Randomex

DALLAS – Users are invited to bring problem disk packs to Booth 1805 to try out the Model 435 disk cleaner made by Randomex, Inc.

The cleaner is automatic and can clean the IBM 1316, 2316, 3336-1 and 3336-11; the Univac 8440, 8416 and 8418; the Calcomp Trident line; the Burroughs B-206 pack; and the Control Data Corp. 9876 and 9877 data storage modules. It is priced at $4,495 from the firm at 27303 Warrior Drive, Rancho Palos Verdes, Calif. 90274.

EFFECTIVE
USE AND APPLICATION OF
MINICOMPUTERS

2nd EDITION • PROVEN MATERIAL • 335 pgs.

The complete How-To-Guidebook for SELECTING, DESIGNING, INSTALLING and OPERATING a Successful Minicomputer System.

Used by thousands in our Worldwide Series of Professional Seminars.

$27.95 prepaid (Mass. Residence add 5%)

INTERNATIONAL MANAGEMENT SERVICES, INC.
215 Oak Street - Natick, Massachusetts 01760

Axiom Corp.

DALLAS – A compact line printer that operates at 160 char./sec and is priced at $655 will be shown in Booth 104 in the Personal Computing Section.

The stand-alone printer includes a case, power supply, Ascii interface, character generator and paper roll holder. An RS-232 interface, with a switch to provide compatibility with Centronics or Tally input connectors, is available for $85.

The unit has a microprocessor controller and prints on 5-in. wide electrosensitive paper with the print formed by passing a high current for 1 μsec from the print head to the paper, the firm said from 5932 San Fernando Road, Glendale, Calif. 91202.

Now you can advertise in five leading computer publications, in five major export markets-in one simple step.

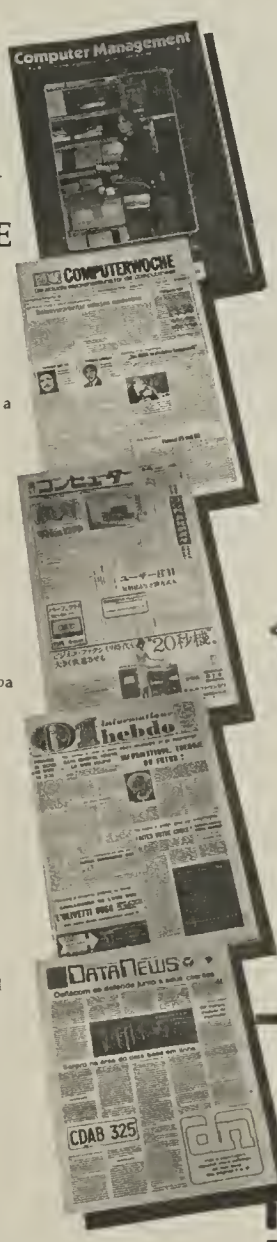
COMPUTER MANAGEMENT
UNITED KINGDOM
World rank as DP market: *Fourth*
1975 DP expenditures: *$2.7 Billion*
1975 imports from US: *$270 Million*
Rank as importer from US: *Third*
Computer Management is a monthly magazine recently purchased by *Computerworld, Inc.* Monthly circulation is 30,000.

COMPUTERWOCHE
GERMANY
World rank as DP market: *Third*
1975 DP expenditures: *$3.7 Billion*
1975 imports from US: *$274 Million*
Rank as importer from US: *Second*
Computerwoche is a weekly tabloid newspaper started by *Computerworld, Inc.* It has a circulation of 21,000 to the West German computer community.

SHUKAN COMPUTER
JAPAN
World rank as DP market: *Second*
1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*
Shukan is a weekly tabloid newspaper, jointly owned by *Computerworld* and Dempa publications Circulation is 35,000.

ZERO-UN INFORMATIQUE
FRANCE
World rank as DP market. *Fifth*
1975 DP expenditures: *$2.5 Billion*
1975 imports from US: *$223 Million*
Rank as importer from US: *Fourth*
Computerworld represents Zero-Un Informatique in the US. Zero-Un has three publications, one a weekly tabloid newspaper with circulation of 22,000; the second a monthly magazine, circulating 13,000 copies; and a new bi-weekly, Minis and Micros. All circulate throughout Europe's French speaking computer market.

DATANEWS
BRAZIL
World rank as DP market: *12th*
1975 DP expenditures: *$250 Million*
1975 imports from US: *$60 Million*
Rank as importer from US: *(Est) 10th*
DataNews is a bi-weekly tabloid newspaper in Portuguese with an English-language summary. It is owned by *Computerworld, Inc.* and has a circulation of 7,000.



Computerworld now has sister publications in five leading international markets for US computers and computer-related equipment. These markets import in excess of a billion dollars of US-made computer products. The publications are operated and edited by local experts, and published in the language of the computer people they serve. And they do an excellent job of covering their markets.
To advertise in any of these publications, all you have to do is contact us at *Computerworld*. We can take care of everything, including translation and resetting of your English-language ads. And our International Marketing Services Division can also help you arrange a broad range of marketing services, from market potential studies to marketing operations set-up.

Just send in the coupon, and we'll send you all the details – including market facts on each country.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

To: Peter Kavanagh, *Sales Manager*
International Marketing Services Division, Computerworld,
797 Washington Street, Newton, MA 02160
(617) 965-5800

I'm interested in your rate card and market facts for the following.

☐ Shukan Computer, Japan
☐ Computer Management, United Kingdom
☐ Computerwoche, Germany
☐ Zero-Un Informatique, France
☐ DataNews, Brazil
☐ I'd also like information on your marketing services.

Name_____ Title_____
Company_____
Address_____ City_____
State_____ Zip_____ Phone_____

Our Remote Computing Services have you covered.

Wherever you're located, Whatever your requirements...

our Remote Computing Services—and the power of our 370/168's, 158's, 148 Host Centers—can keep your future options open.

IN-HOUSE COMPUTER OVERLOADED? ***Try Off-Loading!*** If capacity is limiting output, a *planned off-load* may be the answer. You can plug into the virtually limitless configuration, infinite capacity and state-of-the-art technology of the MMDS Nationwide Computer/Communications Network.

IN-HOUSE COMPUTER UNDER UTILIZED? ***Don't Keep It!*** If your current machine is wasting time and costing too much, *consider replacement.* MMDS' Remote Job Entry Computing Power is convenient, typically 10% to 30% cheaper and more versatile. You'll always work at 100% utilization, paying only for what is used.

Mail to: Dick Nemerson, MMDS Headquarters, 300 E. Joppa Road, Baltimore, Maryland 21204

Please send your: **Computing Services Handbook**

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____

CONSIDERING YOUR FIRST COMPUTER? ***Share It!*** Instead of a small in-house computer, *share your load* by linking to MMDS' Host Computing Centers. Either input your work through an RJE Terminal; or do some processing on your own minicomputer and use it as a terminal too. The link-up will save you money.

CONSIDERING NEW SYSTEMS DEVELOPMENT? ***Get It Free!*** If inventory control, order entry and manufacturing control are as much your concern as computer power, why not tap into our unique Modular Application Systems. MAS is *accessible free* through our remote computing service.

DISSATISFIED WITH YOUR PRESENT COMPUTING SERVICE SUPPLIER? ***Change!*** If your present arrangements just aren't matching expectations, *change* of service is easier than you might think. We're dedicated to total service and satisfied customers. Filling out our coupon is the first step in discovering how we go about it.

Check our prices and services. We'd like to send you our free **Computing Services Handbook.** Effectively a manual for using our Remote Computing Services, it also describes the **MMDS Nationwide Communications Network.** Please contact Dick Nemerson, (301) 321-5744, MMDS Headquarters, 300 E. Joppa Road, Baltimore, Maryland 21204.

Martin Marietta Data Systems

We Build & Run Systems

Software at NCC

1st Datasystems

DALLAS – A Cobol compiler that runs under Data General's AOS operating system will be announced by 1st Datasystems, a division of Data Communications Corp., in Booth 1744.

The compiler is said to implement an extended subset of Ansi 1968 Cobol and offers sequential, random and Isam disk files with up to 32M bytes per disk file. It also offers Ansi editing capability, subscripts to three levels and permits up to 30 characters in data names, as well as featuring block tape I/O and the ability to call Assembly language subroutines, the firm said.

It is compatible with the entire Data General line from the Micronova through the Eclipse C330 and with any of the disk or diskette operating systems. It also provides programming aids including cross-reference source listing, 100 diagnostic messages, a variety of file utilities and a five-key sort program, the firm said.

It will be shown in connection with the company's Unique distributed processing system and the firm's Unique remote terminal system and will be connected on-line to a Burroughs B6700. The division is located at 2985 Vanguard Drive, Memphis, Tenn. 38131.

MRI Systems

DALLAS – MRI Systems Corp.'s System 2000 data base management system and the firm's Control 2000 data dictionary will be the featured products in Booths 1612 and 1614.

The System 2000 interfaces to Cobol, Fortran, Assembler and PL/1 and includes integrated report writer and multi-user/multithread capabilities. The Control 2000 accumulates information about data fields and records, schemas, reports, programs and data base definitions.

The System 2000 costs between $30,000 and $100,000, depending on options, and the Control 2000 costs $15,000. MRI can be reached at P.O. Box 9968, 12675 Research Blvd., Austin, Texas 78766.

Incoterm

DALLAS – In Booths 1870 and 1872, Incoterm Corp. will demonstrate two data entry systems: Data Entry Level II and Local Forms Control. These systems will be operating on the firm's SPD 20 family of intelligent terminals.

Data Entry Level II is a general-purpose package for data entry, forms creation, editing and transmission applications, while the Local Forms Control (LFC) system is designed to emulate IBM 3270 terminals. The LFC system permits diskette storage at the local site providing the ability to store both forms and input data locally, the firm said from 65 Walnut St., Wellesley Hills, Mass. 02181.

NTIS

DALLAS – The National Technical Information Service (NTIS) of the U.S. Department of Commerce will use Booths 1878 and 1880 to "inform the DP community that there exists a federal government agency where a member of the public can go to obtain a computer program, data file or any of hundreds of thousands of information products that the government has produced and paid for with taxpayer money."

The display will include copies and descriptions of these products as well as an on-line terminal to the agency's bibliographic data base, the agency said, noting the average price for these products is about $200. NTIS is at 5285 Port Royal Road, Springfield, Va. 22161.

Cullinane

DALLAS – Cullinane Corp. will use Booth 1553 to highlight the features of its data base management system.

Modules of the system will include the Integrated Database Management System, the Integrated Data Dictionary, the On-Line Query Facility, the Culprit output processor, the IDMS-11 data base management system for the DEC PDP-11 and the back-end data base management system. The firm is at 20 William St., Wellesley, Mass. 02181.

MSA

DALLAS – Management Science America, Inc. (MSA) will show its line of financial software in Booths 1071 and 1073.

The line includes payroll, general ledger and financial reporting, fixed assets, accounts payable, accounts receivable, supplies inventory control and purchasing, and personnel management and reporting software. MSA's general ledger has 450 users and its payroll system has 600, the firm said from 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

Attention: Business Computer Distributors

Don't sell your customers just another computer...

when you can select from the most comprehensive family of business computer systems ever offered...

The SYNERGIST™
BUSINESS SYSTEMS

Start with the broadest choice of business systems ever offered. From a small business mini, to large shared-resource computer networks. Using the industry's most reliable, best price/performance computer mainframe. The Digital Computer D-116, already proven in over 10,000 installations.

Add the broadest line of disk systems, CRT terminals, workstations and printers. Designed and tested to operate together in nearly limitless combinations.

Add operating systems. Application libraries. Software support and our unique Executive Inquiry System, "EIS".

Training programs and maintenance support. Developed through years of business computer experience.

Put it together with one company responsible for system engineering, compatible operation and reliability.

End up with systems with a difference. Systems that can be scaled up without expensive reprogramming. That can start small without future penalty. With big system features. Like plain English requests for special reports. Text retrieval systems. Confidential file security. Spoolers. Editors. Performance at every size level at a price more businesses can afford.

We're still adding the most important part. The smartest, best managed distributors in the business. It's the final link that makes our systems work. If you're the link we missed, write, or call Ronald S. Harvey, Business Systems Sales Manager, 201-575-9100.

Ask about our "Master Distributor," "Private Label" and "Dealership" programs.

We're Digital Computer Controls, Inc. The company that other computer companies call *their* computer company.

DIGITAL COMPUTER CONTROLS INC
A subsidiary of Data General Corporation
12 Industrial Road, Fairfield, N.J. 07006, (201) 575-9100
TWX 7107344310

See us at NCC, Booth No. 1665

Terminals at NCC

Panasonic

DALLAS – Panasonic plans to introduce a multipoint line data entry terminal at Booths 1044 and 1046.

The unit, called the Data Action Tracker, and its associated EIA RS-232C system interface unit were designed to accept punched badges or cards and include 25 options.

The unit can be desk- or wall-mounted, the firm said from 1 Panasonic Way, Secaucus, N.J. 07094.

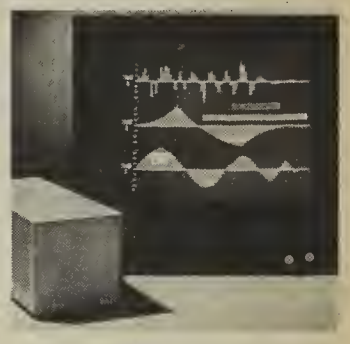
Ann Arbor Terminals

DALLAS – Ann Arbor Terminals, Inc. will have a first at NCC with Booth 1584, staffed entirely by women since there are no men in the firm's marketing department.

In addition, the firm will be introducing the Model 400 CRT display that is teletypewriter-compatible and has scrollable memory.

Another new product is a rack-mountable CRT controller package, the firm said, but did not release further details on the two products.

The firm will also show the graphics option for its line of 2480 terminals and a switchable



Model 400

interface option for the unit. The basic terminal displays 24 lines of 80 characters as well as graphics symbols.

Characters are 64-character Ascii display in a 5 by 7 dot matrix. Prices begin at $1,395 for the controller only or $2,045 for the complete Design III terminal.

The switchable interface option provides for selection of either RS-232 or 20 MA current-loop interface.

The firm is headquartered at 6107 Jackson Road, Ann Arbor, Mich. 48103.

Telex

DALLAS – The Terminal Communications Division of Telex Computer Products, Inc. will display its TC 270 series of terminals that are compatible with IBM 3270 software controls and hardware attachments in Booth 1087.

The TC 270 terminals are directly attachable to IBM 3272 local and 3271 remote control units; they can also be attached through the Telex TC 271 or TC 272 controllers to replace the comparable IBM units.

The TC 271 can operate at 2,400-, 4,800-, 7,200- or 9,600 bit/sec and handle IBM terminals and printers as well as those from Telex.

The display is available in both stand-alone (TC 275) and cluster (TC 277) versions. Both come in Model 1 (480-character screen) and Model 2 (1,920-character screen) configurations.

Unlike their IBM counterparts, the Model 1 versions can be upgraded in the field to Model 2 versions, Telex claimed.

Also on exhibit will be the TC 284 and 234 printers which use the Diablo Hytype I impact print mechanism. The units operate at speeds from 30- to 254 char./sec depending on the application, the firm said from 3301 Terminal Drive, Raleigh, N.C. 27604.

YOU CHOOSE THE WINNER

PROCESSOR	6/16	NOVA 3/4	PDP-11/04
Data Type Lengths (bits)	4,8,16,	16	1,8,16
Instruction Word Length (bits)	16,32	16	16,32,48
General-Purpose Registers	16	4	8
Hardware Index Registers	15	2	8
Maximum Memory Available (KB)	64	64	56
Directly Addressable Memory(KB)	64	2	56
Automatic Interrupt Vectoring	Standard	N/A	Standard
Parity	Optional	Optional	N/A
Cycle Time (nanoseconds)	600	800	725

PRICE	6/16	NOVA 3/4	PDP-11/04
8KB Processor	$2200	$2600	N/A
16KB Processor	$2800	$3200	$3795
32KB Processor	$4000	$4400	$4995
Multipy/Divide Hardware	$ 950	$1400	$1820

Interdata's 6/16 wins the battle of the specs.

Not only do we cost less than the Nova 3/4 and the PDP-11/04, we have more features. Just compare: 16 general purpose registers on the 6/16 to simplify programming and reduce fetches . . . only 4 in the Nova and 8 in the 11/04; 15 hardware index registers on the 6/16 against 2 for the Nova and 8 for the 11/04; 64 KB of directly addressable memory instead of just 2 KB for the Nova 3/4 and 56 KB for the PDP11/04.

What's more; all these hardware features enhance the nimble 6/16's performance. Its cycle time is only 600 nanoseconds, compared to 800 for the Nova and 725 for the 11/04.

Interdata's comprehensive software drives this powerful hardware full out. You get the field-proven OS/16 MT2, a real-time, multi-tasking operating system providing instantaneous response to events, while allowing the user to minimize memory by storing non-critical functions on disks. And the 6/16 can be programmed in your choice of FORTRAN, BASIC or MACRO CAL.

All this and save money too, as much as one-third less than a PDP-11/04 and substantially less on a Nova 3/4 . . . with OEM discounts saving even more.

Get the whole story. Just fill in the coupon or call (201) 229-4040.

Visit us at N.C.C. Booth #1483

Send me 1977 specs on your Model 6/16

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____

INTERDATA®
A UNIT OF
PERKIN-ELMER DATA SYSTEMS
Oceanport, New Jersey 07757. U.S.A.

At last. The small business systems nobody's waiting for.

Data General's new Commercial Systems CS/40 models. They don't keep you waiting because they work the way business works. Interactively.

Multiterminals, no waiting. CS/40 puts data processing power right where your people need it, when they need it. In a distributed network or as a stand-alone system handling multiterminal applications or multiple single terminal applications or both. So some users could be updating inventory, while others enter orders, check payables, and process the payroll. All at the same time. And managers can still access the system any time.

It speaks your language. Interactive ANSI '74 COBOL, the standard business computer language and the language of large computers. With its COBOL, CS/40 has interactive debugging and workstation management, which makes it easier to use from the start.

Small doesn't mean limited. Three compatible models assure that as your company grows, CS/40 can grow along with you. And CS/40 can communicate with other popular commercial systems including our own. With features like up to 40 million bytes of online disc storage. And enough memory for large applications. Plus utility software you wouldn't expect on a small system. And a smart spooler that frees up terminals so your system can do more work.

And everything else you'd expect from Data General. Like innovation, because we put a larger share of our revenues into R & D than any other major computer manufacturer. Like reliability, because we make virtually everything we sell. Add attractive quantity discounts, solid systems engineering, field service and our superior price/performance and you'll understand why there are already over 39,000 systems installed worldwide.

Why wait any longer?

Mail to: Data General, Westboro, MA 01581

- ☐ Send me your Commercial Systems CS/40 series brochure.
- ☐ Send me your brochure and have your sales representative call.
- ☐ Quick, I'm getting ready to purchase. Call me pronto.

Name

Title

Company

Address Tel.

City State Zip

© Data General Corporation, 1977

CW

Data General

It's smart business.

Data General, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., Ontario.
Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361.

See CS/40 operating at NCC booth #1215 June 13-17, Dallas.

Terminals at NCC

Western Union Data Services

DALLAS – A teleprinter offering 120 char./sec throughput with keyboard entry will be shown in Booth 2008 by Western Union (WU) Data Services.

The EDT 1232 keyboard send/receive (KSR) unit has a 1K-character buffer and permits 132 print positions per line. A heavy-duty print mechanism utilizing the belt printer concept with font individual character "fingers" is used.

The teleprinter has a standard Ansi four-row keyboard capable of generating 128 Ascii characters, including lower- and upper-case characters. Control functions are clustered in the left corner of the keyboard; in the right corner is a numeric cluster.

The terminal transmits and receives data at 10-, 30- and 120 char./sec, switch selectable, in serial form. It operates in an attended or unattended mode over the dial-up network.

Other features include form feed at the rate of 8 in./sec; vertical tabulation; and horizontal tabulation to any character position across the width of a print line.

The unit is equipped with an RS-232 interface with customer-provided equipment. For systems operating in half-duplex, an optional feature provides an interface into a Bell 202-type data set to allow for line turnaround on specific Ascü characters and reverse channel operation.

Options include parity error detection with alarm and character substitution; manual and automatic 20-character answerback; and current-loop interface of 20- or 60 mA.

EDT 1232

Prices for the EDT 1232 KSR including maintenance start at $150/mo on a three-year lease, the firm said from One Lake St., Upper Saddle River, N.J. 07458.

Datamedia Corp.

DALLAS – Datamedia Corp. plans to put six terminals on display at Booths 1012 and 1014.

The Elite 1500A alphanumeric terminal is compatible with Teletype models 33 and 35 when the RS-232C interface is used. The unit, priced at $1,250, operates only in the roll mode; all data enters on the bottom line of the display on a character-by-character basis.

The memory is modular, providing display capacities from 256- to 1,920 characters, the firm said, and the data rate is switchable between any two speeds in the 50- to 4,800 bit/sec asynchronous range.

The Elite 1520A is an unbuffered Teletype-compatible unit that displays 1,920 characters in a 24-line by 80-character format with a 64-character Ascii set. The full 128-character upper and lower case Ascü set and APL/Ascü switch-selectable capabilities are available optionally. Basic models start at $1,555.

Portable Versions Available

The two units also come in portable versions.

The Elite 4000A to be exhibited is a programmer terminal system with an 8-bit word length. It features a block-oriented display organization, interrupt-driven vectored I/O, expandable display memory to 32K and stored memory tag bits, the firm said from 7300 N. Crescent Blvd., Pennsauken, N.J. 08110.

Extel

DALLAS – The featured product at Extel Corp.'s Booths 1654, 1656, 1658 and 1660 will be the Series B teleprinters, a microprocessor-based line of programmable terminals.

The unit speeds vary from 15 char./sec to 30 char./sec on Telex or private-line terminals. The basic modular hardware can be configured as receive-only (RO), keyboard send/receive (KSR) or automatic send/receive (ASR), 5- or 8-level, with a range of interfaces and codes.

Memory is available in 4K or 8K sizes to either augment or replace the paper tape feature, Extel said.

Monthly rentals for the Series B range from $70 to $185 for a one-year term. Extel is at 310 Anthony Trail, Northbrook, Ill. 60062.

THE COMPLETE
DASD MANAGEMENT SYSTEM
DMS/OS

BASIC SYSTEM:

ARCHIVAL
Explicit archiving of data sets, PDS members and aliens • Automatic restore of data sets, PDS members and aliens • Backup of archived data sets

ARCHIVE/TAPE MANAGEMENT
Consolidation of partially filled archive tapes • Purge of expired and deleted archive files • Standard Labels • No JCL requirements • Interface with popular tape management systems

SELECTIVE DUMP/RESTORE
Copy to archive • Selectively backup only data sets with update activity • PDS member and member group selectivity

PDS MANAGEMENT
Tailored PDS status reports • Capacity threshold notification • Compression of PDS including recovery of lost space, elimination of secondary extents and extending of directory

DATA SET RETENTION CONTROL
Automated means of removing data sets which illegally occupy space on controlled volumes and eliminating data sets which have expired

MIGRATION OF ALL SEQUENTIAL DATA SETS
All sequential generation groups may be migrated from DASD to tape with the use of a single parameter • Multiple migrate commands may be placed in the input stream to scan different sets of volumes with different criteria • Migration takes place on the basis of data set size and elapsed time • Complete backup with catalogue recovery

MANAGEMENT REPORTS
PDS status reports • Data set dictionary • PDS directory • Data set index • Free space detail • Volume layout • Volume map • Volume allocation summary • Volume attribute summary • Archive volume reports • DASD utilization graph by hour of day plus day of week

SYSTEM INTEGRITY
Transparent restart • Generation and recovery of files and tables • Duplication of archived tapes • Reserves and dequeues of shared DASD • Audit trail/traces

LATEST ENHANCEMENT
3330 to 3350
NATIVE MODE MIGRATE

ADDITIONAL SELECTABLE UNITS
1. DASD Space Billing
2. TSO Command Processor
3. CICS, IMS/TP Interface
*4. Mass Storage Support (3850 Compatible)
5. Volume Configurator

PARTIAL USER LIST

Standard Oil of Calif.	Western Electric	Royal Bank of Canada
Exxon	National Distillers	State of Washington
Federated	Detroit Diesel/GM	R. Angus

DMS/OS is available for all versions of the full 360/370 operating system (MFT, MVT, VS1, VS2, MVS and VM) and supports all current IBM compatible drives.

*Mass storage user group information available
DOS V/S version available 4th qtr 1977
For an on site evaluation or detail documentation please call or write

SOFTWARE MODULE MARKETING
THE SUPERMARKET OF SOFTWARE
CROCKER BANK BUILDING/PENTHOUSE
1007 7th STREET • SACRAMENTO, CA 95814 • (916) 441-7234

ADM-3A
12 MONTH RENTAL PER MO. $49.00 ANNUAL SERVICE CONTRACT $125

• Teletypewriter compatible
• 12-inch rectangular screen with large easy-to-read characters
• 24-line display with full 80-character lines
• 59-key keyboard designed to office teletypewriter layout, and containing all teletypewriter data and control keys
• Switches at front panel and on logic board permit easy selection of performance features
• Optional numeric keypad

DECwriter II LA-36
12 MONTH RENTAL PER MO. $70.00 ANNUAL SERVICE CONTRACT $195

OPTIONS

OPTION	DESCRIPTION	PRICE	RENTAL
LAXX-KG	EIA (Standard)	$ 50.00	$ 3.00/MO.
*LAXX-LV	Top of Form	190.00	9.50/MO.
*LAXX-LY	TOF, HT and VT	325.00	17.00/MO.
*LAXX-MA	Auto Line Feed	93.00	7.00/MO.
LAXX-MB	Mounting Kit	110.00	5.75/MO.
LAXX-KZ	Paper Out Sensor	20.00	1.00/MO.
LAXX-LF	14-Key Numberic Pad	125.00	2.50/MO.

*MOUNTING KIT REQUIRED

GET COMPLETE DETAILS WITH A DIRECT CALL
800/527-7700
or 214/252-7502
service 800/527-5608

vardon & associates
930 N. Beltline • Irving, Texas 75061
a subsidiary of Pioneer Texas Corp

Terminals at NCC

Ontel Corp.

DALLAS – Ontel Corp.'s OP-1 programmable terminal will be at work in Booth 1197 performing applications ranging from word processing through terminal emulation to data entry.

The firm will also show a disk operating system with up to 40M bytes of storage and two higher level languages – Basic and a Cobol-type language called Sacbol – as well as Assembler.

The OP-1 includes a microprocessor and is priced at $2,285 with 4K words of memory. It contains a display, keyboard, terminal logic, memory and room for five I/O controllers.

The terminal logic consists of three microprocessors dedicated respectively to CPU functions, I/O functions and display functions.

In addition, it has a 256- or 512-byte bootstrap loader. Controllers for disk; diskette; printers; asynchronous, bisynchronous and synchronous communications interfaces can be attached to the direct memory address ports controlled by the I/O microprocessor, Ontel said.

The microprocessor for CPU functions is an Intel 8080 with 2 microsec cycle time and an 8-level interrupt capability.

The asynchronous adapter is an RS-232 interface that can handle rates of 110- to 9,600 bit/sec with data transmission in character or block mode, full or half duplex.

The synchronous controller is an RS-232-compatible interface that handles rates up to 50 kbit/sec in direct point-to-point or multipoint transmissions, the firm said from 250 Crossways Park Drive, Woodbury, N.Y. 11797.

Tano

DALLAS – Tano Corp.'s Booth 1126 will be centered around the Outpost 7 intelligent terminal.

The CRT terminal with standard teletypewriter-compatible keyboard and 10-key numeric pad features a 96-character upper- and lower-case Ascii set on a 24 by 80 display. Memory capacity is 8K bytes expandable in 4K increments up to 64K bytes.

Data transmission is possible at speeds from 110 bit/sec to 9,600 bit/sec in serial asynchronous mode. Program storage is on tape cartridges and an optional serial printer interface is available.

The terminal also permits data editing and allows the user to generate custom CRT formats, Tano said.

The basic terminal with 8K of memory, keyboard, CRT, tape and communications interface costs $4,690. Tano is at 4521 W. Napoleon Ave., Metairie, La. 70001.

Datagraphix

DALLAS – Datagraphix, Inc. is planning its Booths 1887 and 1889 around the Model 132A display terminal, which features a 132-column output format.

Microprocessor-controlled, the 132A offers a 96 upper- and lower-case Ascii set, a 60- or 120-line buffer, cursor control, single-line editing, tabbing, scrolling, dual brightness, multiple asynchronous transmission speeds of 110- to 9,600 bit/sec in full- or half-duplex mode and an optional 132-column serial printer.

The basic unit has 8K buffer memory with 16K optional. All functions including cursor sensing and addressing are controllable from the host computer, the vendor said.

The terminal displays 30 lines on an 8.5- by 11-in. screen with a 60-cycle refresh.

The basic 8K unit costs $3,950 and is available from Datagraphix at P.O. Box 82449, San Diego, Calif. 92138.

Volker-Craig

DALLAS – Volker-Craig Ltd. will be showing its line of Teletype-compatible CRTs priced from $1,595, in Booth 1095 at NCC here.

Standard features include RS-232C interface, nonglare CRT, keyboard with cursor control key cluster, direct cursor addressing and data rates up to 9,600 bit/sec.

The firm is based at 266 Marsland Drive, Waterloo, Ont. N2J 3Z1, Canada.

Computer Devices

DALLAS – The line of Miniterm terminals will be displayed by Computer Devices, Inc. (CDI) in Booths 1513, 1515 and 1517 at NCC here next week.

The models 1201, 1203 and 1204 of the series were described as compact units, with the 1201 a receive-only terminal for such applications as CRT hard-copy output and minicomputer printing consoles.

The 1202 is a keyboard send/receive unit with selectable 10-, 15- or 30 char./-sec printing speeds and an RS-232 interface with three modes of operation: Teletype, typewriter and numeric.

The Model 1203 is a portable unit with a built-in modem and acoustic coupler and the same features as the 1202.

The 1204, the newest member of the Miniterm family, is an automatic send/-receive terminal with an integral minicassette providing storage of up to 68,000 characters per cassette, with 83-character block recording and off-line block and character editing capability. It also has an 8K memory expandable to 32K, which includes up to 7K for editing work space.

The unit has a 1,000-character buffer and a 35 char./sec printing speed, according to CDI at 9 Ray Ave., Burlington, Mass. 01803.

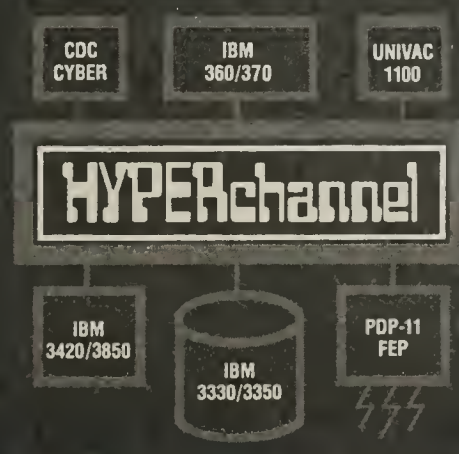
distributed payroll processing?

Try Wang NETWORK PAYROLL, it
Puts error correction where errors occur,
Transmits paychecks via telephone,
Removes input edit load from the host,
Manages multi-terminal nets,
Provides transmission security,
Runs with JES, HASP, or POWER.

For more on Wang single-source NETWORK PAYROLL, call Joe Nestor at Wang Laboratories, Incorporated, Lowell, Massachusetts at (617) 851-4111.

WANG

Can your systems talk to one another... efficiently?



They can with HYPERchannel™!

Break the data flow logjam between multiple CPU's, peripheral subsystems, and specialized processors of mixed manufacturers. Through the sophisticated system architecture, control logic, and technology of HYPERchannel you get:

- Dynamic switching for CPU access to all other system elements
- Resource sharing between facilities up to 1 mile apart
- Data transfer up to 50 mbits over coax trunk
- Multiple, simultaneous data paths
- Up to 64 devices on single trunk
- Saved CPU time, channel time, and money

HYPERchannel is unique, cost-effective — and necessary!
Call or write today. NCC, Booth #1178

Network Systems Corporation
6820 Shingle Creek Parkway
Brooklyn Center, MN 55430 (612) 566-5050

San Francisco — 415/344-6331 Huntsville — 205/539-7929
Washington, D.C. — 703/938-4215 Detroit — 313/569-1801

Terminals at NCC

Termiflex Corp.

DALLAS – The highlight of the Termiflex Corp. exhibit will be four interactive hand-held alphanumeric terminals.

The HT/3 displays a single line of 12 alphanumeric characters and sells for about $500. The HT/4 has 24 characters in two lines and costs slightly more.

Both units operate at 1,200 bit/sec, have even parity, display the 64-character Ascii set and operate in full-duplex mode.

The HT/5 was designed for applications where only the status of certain functions needs to be displayed. The terminal has an annunciator display of 12 labeled lights and a full alphanumeric keyboard.

The HT/8 features a display of 80 upper- and lower-case characters and operates at 10-, 15-, 30- or 120 char./sec in full- or half-duplex mode.

Alphanumeric Terminals

All the units provide two-way, bit-serial, asynchronous communications of Ascii codes and are RS-232C compatible.

Termiflex, which will be in Booths 1600 and 1602 for the conference, can usually be found at 17 Airport Road, Nashua, N.H. 03060.

Spatial Data

DALLAS – The Eyecom Picture Digitizer and Display Terminal will spotlight Spatial Data Systems' Booth 2013 at NCC here.

The terminal permits automatic input of grey-tone pictures, line drawings and optical character recognition (OCR) numerals in addition to keyboard data entry and full alphanumerics, the firm claimed.

The unit should find use in applications such as the storage and retrieval of pictures for automatic typesetting, OCR reading of numerals on ID cards or automatic line drawing input and editing in computer-aided design systems.

The firm is at Box 249, 508 S. Fairview, Goleta, Calif. 93017.

Comtek, Inc.

DALLAS – Comtek, Inc. will introduce the Comtek-21, an intelligent terminal system, in Booth 2045.

The unit features a standard 8K memory expandable to 12K and a minifloppy disk built into the unit. The 1,200 bit/sec communications modem is also built into the system.

The unit has a hard-copy printer with 25-character columns that operates at 420 line/min.

There is a 16-character prompting LED display and an alphanumeric and 10-key numeric pad with the system. Options include a light pen scanner, floppy disk system and parallel interface.

Software with the system includes data entry programs for payroll, general ledger, accounts payable, accounts receivable and inventory and a general-purpose format program, according to the firm.

The unit rents for $165/mo including maintenance, Comtek said from home base at 4216 McCullough, San Antonio, Texas 78212.

Magnavox

DALLAS – A line of plasma display-based graphics terminals will be shown by Magnavox Display Systems in Booths 1277 and 1279.

The latest member of the family – a stand-alone graphics terminal – will be introduced at the show. An upgrade of the Orion-60 series, it has resident Basic containing graphics extensions, a disk drive and up to 56K of expandable random-access or read-only memory.

The basic Orion-60, with prices starting at $5,995, contains an Intel 8080 microprocessor and features such items as touch-panel operation; rear projection of film images; a 2K-byte random-access memory for downloading of customer-designed character sets; and the ability to emulate such terminals as the Tektronix 4010 series, the firm said.

The company is located at 2131 S. Coliseum Blvd., Fort Wayne, Ind. 46808.

Data Specialties

DALLAS – Data Specialties, Inc. will introduce a paper tape reader/punch which will attach to any terminal through the RS-232 or current-loop connector.

Shown in Booth 1525, the unit features full/half duplex, line/local, search/edit control and selectable speeds.

The SRP-300 can be remotely controlled from the line or terminal through the standard DC1-DC4 codes. The unit is priced at $2,095, the firm said from 3455 Commercial, Northbrook, Ill. 60062.

Digital users, here's hundreds of ways to make your Digital equipment perform even better.

You'll find them colorfully illustrated in our free (new) 56 page Supplies and Accessories catalog.

Digital's Supplies and Accessories catalog contains just about every kind of Digital supply for virtually every piece of Digital equipment you can think of.

You'll find supplies for disk drives. Terminals. Line printers. Word processing systems. You'll find cabinetry. Terminal stands. Tables. And much more. And every single tape, cartridge disk pack, ribbon—everything—is made specifically for Digital Equipment. So you can be sure they're going to work perfectly before you buy them.

What's more, they're all kept ready on-the-shelf for fast delivery.

For your free Digital Supplies and Accessories catalog—send the accompanying coupon today. Digital Equipment Corporation, 248 Main Dunstable Rd., Nashua, New Hampshire 03060. (603) 889-8900. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. In Canada: Digital Equipment of Canada, Ltd.

Supplies Group, Digital Equipment Corporation, 248 Main Dunstable Road, Nashua, New Hampshire 03060. Please rush me the 1977 Digital Supplies and Accessories Catalog. digital

Name_____ Title_____

Company_____ Phone_____

Address_____

City_____ State_____ Zip_____

Computer (e.g. PDP-11, PDP-8, DECsystem 20, etc.) _____

CW667

Terminals at NCC

General Electric

DALLAS – A free-standing magnetic tape terminal featuring character string switch and a multiform printer will be the highlight of Booth 1585, operated by the Data Communications Product Department of General Electric (GE).

The Terminet Magnetic Tape Terminal is available in either single- or dual-cassette versions with two RS-232C interfaces to accommodate a data set and a printer, CRT or other peripherals.

Magnetic Tape Terminal

Block recording allows the user to select block lengths of 88-, 144- or 166 characters through a strapping option; data storage capacity ranges from 100,000- to 125,000 characters, the firm said.

The cassette is Ansi-compatible and the read/write rates are switch-selectable at 10-, 20-, 30-, 120- and 240 char./sec. The single-drive unit leases for $63/mo and sells for $1,875.

The Terminet Multiform Printer can print nine-part forms at a rate of 30 char./sec, GE said. The operator selects the number of copies needed.

The printer is priced at $1,675, according to the division in Waynesboro, Va. 22980.

Questronics

DALLAS – Questronics, Inc. will be at Booth 1645 to debut its Printing Response Time Monitor and show its terminal performance monitor.

The Printing Response Time Monitor has a built-in 20-column matrix printer which prints response time information either automatically or on command for terminal-monitoring applications. It can monitor up to four terminals at a time.

The response time threshold can be set manually, Questronics said. When this is exceeded, the transaction time and the time of day are printed out.

The Terminal Response Time Monitor was designed to measure the performance of interactive terminals and can measure the response time of each transaction, computing the average of these times and retaining the minimum and maximum response times which have occurred.

It uses an optical coupler system and is under the control of a microprocessor. It costs $950, the firm said from 3596 S. 300 West, Salt Lake City, Utah 84115.

Eprad

DALLAS – The Applications Group of Eprad, Inc. will have its terminal line out for inspection at Booth 2127 at NCC here.

The AG-60 graphics terminal features three character sets, a 512 by 512 dot matrix for graphics and a selection of two keyboard styles, a touch panel and sonic pen for graphics.

The AG-90 features a data rate of 110- to 9,600 bit/sec and a plasma display panel with an active area of 2.5- by 8 in.

The AG-60 costs $750 and the AG-90 starts at $1,750, the firm said from 123 W. Woodruff, P.O. Box 4712, Toledo, Ohio 43620.

Delta Data Systems

DALLAS – Delta Data Systems Corp. will exhibit the Delta 3700C cluster system for distributed processing applications in Booths 1276 and 1278.

The 3700C is a floppy disk system that allows up to eight Delta 4000, 4300E or 4500 CRT terminals and two serial read-only printers to share access to up to 1.5 million bytes of storage.

Also on display will be the Delta 4050 microprogrammable CRT terminal for Burroughs, Honeywell and Univac emulation in multidrop data communications networks; the Delta 4300E text processing expanded refresh CRT terminal with up to 8.5K bytes of memory and full text manipulation features; and the Delta 4500 user-programmable CRT terminal with up to 16K bytes of memory designed for interactive and off-line intelligent data processing applications.

Delta Data is based at Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

Try Datapro for 30 days!

You can use any one of Datapro's information services for 30 days with no purchase obligation. Investigate new products, compare their costs, check specs, performance, and users' ratings. Review the competition. In short, see for yourself why over 100,000 EDP professionals rely on Datapro information.

Datapro 70— The EDP Buyer's Bible

The world's most popular EDP information service. Used by EDP professionals in over 10,000 installations worldwide. The first and only complete, comprehensive reference service on EDP hardware, software, services and suppliers. •Computers •Peripherals •Data Communications •Software •Media & Supplies •Suppliers •Feature Reports •User Ratings •Case Histories •Profiles of Thousands of Products •*Newscom* Newsletter

Datapro Reports on Minicomputers

Incisive reports and commentary on all aspects of the dynamic minicomputer and microcomputer industries. With the continued and rapid evolution of micro-mini technology and applications, this is a vital tool for DP professionals in every segment of the industry. •Feature Reports •Case Studies •Minicomputers •Microcomputers •Small Business Computers •Software •Peripherals •Vendors •*MiniNews* Newsletter

Datapro Reports on Data Communications

A totally different service offering broader scope and greater depth on the complete universe of data communications products, services and techniques. Includes product profiles, feature reports, user ratings, comparison charts, easy-to-read tutorials. •Glossary •Concepts •Computer Systems •Processors •Software •Terminals •Telephone Systems •Transmission Facilities •Modems •Multiplexors •Remote Computing •Suppliers •*Datalink* Newsletter

Datapro Reports on Office Systems

This service provides information on the full spectrum of office products, systems, techniques and companies. For all levels of office management. •Word Processing •Copiers & Duplicators •Typewriters •Dictation •Telephone & Voice Communications •Microform Systems •Programmable Calculators •Printing & Composition •Mailing & Addressing •Audio/Visual •Facsimile •*OfficeNews* Newsletter

Datapro EDP Solutions

Results-oriented answers to the challenges facing EDP management, presented in documented, non-technical terms. Proven solutions to unavoidable problems of EDP personnel management, systems development, operations optimization, standards, procurement and other areas. •Technology Update •Systems Development •Operations •Technical Support Functions •User Ratings •Supplier/Association Directories •Glossary •*Newsbriefs*

Datapro Directory of Software

This monthly updated directory service from Datapro provides objective, uniformly written software product profiles to help you compare and select the most effective packages for your applications. Indexed four ways. •Objective Software Descriptions •Users' Software Ratings •New Listings Monthly •"Make or Buy" Criteria •Hardware/System Requirements •Product Costs •Product History •*Software News* Newsletter

Datapro Reports on Banking Automation

Designed specifically to provide banks and thrift companies with an authoritative information service about the unique automated systems that are so dynamically changing this business segment. A must for today's progressive banker. •Feature Reports •EFTS •Teller Terminals •Automated Tellers •MICR Equipment •Credit Authorization •Specialized Equipment •Applications Software •*BankNews* Newsletter

Datapro Reports on Retail Automation

Designed to provide buyers, planners, and manufacturers of POS/retail store systems with objective analyses of currently available products and services. This all new Datapro service features over 400 pages of detailed reports. •Integrated POS Systems •Electronic Cash Registers •Credit and Payment Systems •Specialized Equipment and Systems •Vendors •Applications •Software •*RetailNews* Newsletter

Special offer: no purchase obligation

Under Datapro's unique Trial Subscription Plan, you can try any one of the above information services in your office for 30 days with no purchase obligation. As a Trial Subscriber, you'll enjoy all the privileges of a regular subscriber.

You'll receive: •The looseleaf volumes •Monthly updates to the volumes •Monthly newsletters •Unlimited inquiry service. For details on this Trial Subscription Plan, write to Datapro today.

See us at NCC—Booth 1521

For faster service, phone toll free

800-257-9406

In New Jersey, 609-764-0100.

datapro

Datapro Research Corporation ☐ 1805 Underwood Blvd. ☐ Delran, NJ 08075 ☐ 609/764/0100 ☐ A McGraw-Hill Company

...And Other Things to See

Megatek

DALLAS – Megatek Corp. will announce its Megraphic 5000 series of refresh graphic terminals and systems in Booths 1216 and 1218.

Standard features include 12-bit (4K by 4K) screen resolution, a 21 in. electromagnetic monitor, hardware blink, translation, dashed lines and constant intensity vectors, Megatek said.

Also included as part of the package is a Data General Nova 3 minicomputer, expandable to 128K words, and an upper/lower case keyboard with 20 function keys.

Micro-Based Display

The Megraphic 5000 system features a microprocessor-based graphic display unit, the MG552, which occupies two slots in the Nova and provides digital-to-graphic conversions, control and display functions. Standard and user-definable hardware character sets are available.

The Megraphic 5000 costs between $20,000 and $25,000 depending on options, the firm said from 1055 Shaffer St., San Diego, Calif. 92106.

Nine From Britain

DALLAS – Nine British firms, under the sponsorship of the Business Equipment Trade Association, London and the British Overseas Trade Board, are planning to participate at this year's NCC with a variety of the latest equipment from abroad.

Modular Technology will feature its Minimodem, an acoustically coupled, portable device which can operate up to 300 bit/sec. Also on display in Booth 1808 will be the Interfaker, a diagnostic and patching aid for modems and terminals. Modular Technology can be reached at P.O. Box 117, Watford WD1 4PD, England.

The Datapad data entry system will be shown by Quest Automation, Ltd. in Booth 1812. Datapad consists of a special writing pad, a small display and a minicomputer equipped with the firm's special software. The system allows data to be entered on the special pad using any pen or pencil using almost any freehand writing style. Quest Automation is at 26 Cobham Road, Ferndown Industrial Estate, Stepehill Wimborne, Dorset BH21 7NP.

Calculus computer tape is being exhibited by Racal-Zonal, Ltd., which will also show a range of accessories including the type BU4000 magnetic tape cleaner and digital cassettes. Racal-Zonal can be found in Booth 1806 or at its U.S. representative, Racal Communications, 5 Research Place, Rockville, Md. 20850.

The problems of plant layout, pipe routing and pipework design can be tackled by the Pipework Design Management System, to be shown by Computer Aided Design Centre in Booth 1705. The centre can be contacted at Madingley Road, Cambridge, England.

The items on display at Sintrom's Booth 1707 will all be related to the 3M-type DC 300A data cartridge, the Perifile 6000C minicomputer peripheral and the Perifile 6041 buffered tape emulator. Sintrom's U.S. distributor is Marquest, Inc., 2315 Otis Ave., Santa Ana, Calif. 92704.

Management Systems and Programming will feature the Manager line of software packages, including Datamanager, a data dictionary system; Testmanager, a structured programming testing system; and Projectmanager, a project control system. Situated in Booth 1711, the firm can be reached through its U.S. subsidiary, MSP, Inc., 594 Marrett Road, Lexington, Mass. 02173.

Facit-Addo, Inc., 66 Field Point Road, Greenwich, Conn. 06830, will show a range of automatic line indicating machines called Facit Liners, which are full frontal copyholders used to ensure copy is visible at all times. The two basic models take copy up to 13 in. by 10 in. and 13 in. by 16-1/2 in., respectively, and are designed for use in typesetting or terminal keyboard equipment. The Facit Liners can be seen in Booth 1810.

Two British publishers are also taking booths. IPC Electrical-Electronic Press, Ltd., in Booth 1709, will feature two of its journals: *Computer Weekly*, covering international news, and *Data Processing*, which provides in-depth coverage of computer management. Gershire, Ltd., in Booth 1713, will feature the monthly *Systems International*, a magazine directed to computer designers, users and software specialists. IPC Press is at Dorset House, Stamford St., London SE1 and Gershire can be contacted through Larry Krasner, 14241 Ventura Blvd., Sherman Oaks, Calif. 91413.

Attendees who wish to contact the Business Equipment Trade Association will find representatives of the group in Booth 1804.

Clinton

DALLAS – A wide range of CRTs will be shown in Booth 1149 by Clinton Electronics Corp.

The units are designed for applications such as data displays, medical electronics and video recording monitors. The exhibit will feature the firm's "Supertubes" with high contrast phosphors, the firm said. Clinton is located at 6701 Clinton Road, Rockford, Ill. 61111.

Anderson Jacobson

DALLAS – Anderson Jacobson, Inc. (AJ) will display communications hardware in Booths 1780, 1782 and 1784.

The latest AJ products being shown for the first time are the AJ 860 teleprinter terminal and AM 211 and A 211 acoustic couplers designed to CCITT specifications to handle international telephone styles.

Designed for interactive operation with mainframe time-sharing or transaction processing applications, the AJ 860 is a 60 char./sec matrix printer with three switch-selectable print speeds, including a keyboard with 17-key numeric pad.

The teleprinter also features self-diagnostics and 132-column printing, a spokeswoman said. It is priced at $2,950.

The acoustic couplers can handle 300 bit/sec communications in half- or full-duplex originate-only modes.

The AM 211 differs from the A 211 in that it can attach directly to telephone lines. Both couplers have acoustic interfacing capabilities, the spokeswoman said.

The AM 211 costs $495; the A 211 price was unavailable from the firm at 521 Charcot Ave., San Jose, Calif. 95131.

Tandberg Data

DALLAS – Tandberg Data, Inc. will use Booth 1065 to display its TDV 2100 series of CRT terminals and its TDI 1050 synchronous tape transport.

The TDV 2100 contains a microprocessor and can be equipped with up to four cartridge recorders or four IBM-compatible diskette units.

The basic unit has 2K of memory, which can be expanded to 64K. Software with the system includes Assembler, Debug, Editor, Basic Interpreter and a Tape Operating System, the firm said, adding the basic unit is priced at $7,000.

The TDI 1050 tape transport is a microprocessor-based unit that reads and writes data at densitites of 1,600 char./in. phase-encoded or 800-, 556- and 200 char./in. NRZI at speeds of 12.5- to 45 in./sec, either 7- or 9-track.

The transport is priced at $2,990, the firm said from Suite 407, 4901 Morena Blvd., San Diego, Calif. 92117.

Aspen Ribbons

DALLAS – A line of ribbons for Diablo Hytype printers and printers from Qume, Burroughs, Interdata and IBM, plus ink rolls for Decision Data, Burroughs, Univac and Printec equipment, will be featured in Booth 1874 by Aspen Ribbons, a United Recycle Co., 1700 N. 55th St., Boulder, Colo. 80301.

Fenwal

DALLAS – Fenwal, Inc.'s Halon 1301 fire suppression system will be shown with live demonstrations in Booths 2064 and 2065. Fenwal's address is P.O. Box 309, Ashland, Mass. 01721.

When we plant a terminal...

It gets as much TLC as Marilyn gives her potted Spathiphyllum.

Terminals are just as sensitive as plants so it's important to pick the right one for *your* job. That's why Trendata offers a wide range of printing terminals and magnetic tape recorders to fit any number of applications.

And since terminal productivity stems from proper training, Trendata field reps make sure your people understand all the do's and don'ts of terminal operations.

Should maintenance problems arise, they are immediately pruned out by our own nationwide service people. The last thing you need is a terminal withering on the line.

As we mentioned, anything that grows needs TLC . . . and if your system isn't getting Terminal Loving Care, we'd like to cultivate a little conversation.

trendata

610 Palomar Ave., P.O. Box 5060, Sunnyvale, CA 94086 (408) 732-1790

AN APPLIED MAGNETICS COMPANY

...And Other Things to See

American Microsystems

DALLAS – The MDC-140 computerized logic analyzer will be introduced by American Microsystems, Inc. (AMI) at this year's NCC in Booths 1051 and 1053.

The 40-channel analyzer allows 1,024 steps to be traced and formatted under total software control, the company said. The unit is designed to work with AMI's microcomputer development system.

The MDC-140 connects to any digital circuit through a set of probes; both a 40-pin DIP-clip and a set of 40 individual hooks are available. The probe thresholds can be adjusted in groups of 10 for any level from -15 to +15 V. With software-controlled formatting of the captured signals, any design can be checked – not just MOS microprocessors, but other families or mixtures as well.

Working through the development system's CRT and keyboard, the operator can specify two separate 40-channel qualifiers, a post-qualification delay of up to 64K clock cycles, another qualifier which generates data-dependent clock cycles and a fourth qualifier which pulses its own outbound trigger line for external gear. All these qualifiers can be combined in various ways with the analyzer's 10 MHz clock source or with either edge of an incoming user clock signal, the company explained.

Once the qualifiers have taken effect and the specified delay has elapsed, 1,024 captured steps can be displayed in pages of 16 lines. The format of each line is under user control: binary, Ascii, hex or symbolic lists.

Each format can be brought in from a floppy disk file and modified as needed, because the software supporting the MDC-140 includes a built-in text editor. Modified formats can also be saved on a disk file for future use, AMI said.

The MDC-140 is a plug-in peripheral option for AMI's microcomputer development center, the MDC-100.

An MDC-100 with 6K of firmware, 2K addressable display random-access memory (RAM), 16K user RAM (expandable to 48K) and a dual floppy disk drive costs $9,600. The MDC-140 hardware costs about $4,000. AMI is at 3800 Homestead Road, Santa Clara, Calif. 95051.

Pro-Log Corp.

DALLAS – A random-access memory (RAM) buffer option for the Series 90 programmable read-only memory programmer (Prom) will be the featured attraction at Pro-Log Corp.'s Booth 1089.

The 9107-1 buffer option provides 1K of work space where Prom code can be accumulated and manipulated prior to programming a blank Prom. The buffer can be loaded from the Series 90 keyboard or from the master Prom. The copy Prom can then be programmed directly from any portion of the buffer.

Other features include sequential display and loading or buffer contents, editing capabilities, and duplication, verification and reset modes.

The unit is priced at $300 with immediate delivery from Pro-Log at 2411A Garden Road, Monterey, Calif. 93940.

Knickerbocker Case

DALLAS – Computer servicemen will have an opportunity to examine a vast array of tool cases made by the Knickerbocker Case Corp.

The cases are made of wood covered with vinyl or leather and can hold either tools or parts. A special Ajusta Case holds printed circuit boards of almost any size. The company also makes custom-designed cases to fit individual needs.

Located in Booth 1202 at the show, Knickerbocker can be reached at 2950 W. Chicago Ave., Chicago, Ill. 60622.

Elgar

DALLAS – Elgar Corp. will introduce a line of high isolation transformers in Booths 1008 and 1010.

All models are connectable for 120 VAC or 240 VAC input or output, which enables them to be used as a combination stepdown transformer and noise isolation device. All models are also rated for either 50 Hz or 60 Hz operation and prices start at $290, the firm said from 8225 Mercury Court, San Diego, Calif. 92111.

Data Maintenance

DALLAS – Data Maintenance, Inc. will introduce the DMI 600 disk pack inspector in Booth 1807.

The unit, priced at $2,350, provides radial and axial runout checks of disk services with a series of comb gauges and can be used to inspect all standard IBM packs, including the 1316, 2316 and 3336-11. It can also be used for Univac's 8416 and 8418 packs, Burroughs' B-206 and Calcomp's Trident series. Data Maintenance can be reached at P.O. Box 2727, Rolling Hills Estates, Calif. 90274.

McGraw-Hill

DALLAS – McGraw-Hill Book Co. will be displaying its magazine *Data Communications*, textbooks and professional and reference books in the DP field.

In addition, the publishing firm will provide information about its Computer Professionals' Book Club.

McGraw-Hill, 1221 Avenue of the Americas, New York, N.Y. 10020, will be located in Booths 1744, 1746 and 1748 for the conference.

Sargent & Greenleaf

DALLAS – Sargent & Greenleaf, Inc. will show its line of security mechanisms in Booth 2022. The line features the Code/Tronic II, a single-door access control unit that has up to 10,000 four-digit combinations, as well as the Brute electric lock, the 8077 padlock, combination locks, deadbolts and file cabinet locks, the firm said from One Security Drive, Nicholasville, Ky. 40356.

Deltec

DALLAS – Uninterruptible power systems (UPS) and line monitors will be shown in Booth 1004 by Deltec Corp.

Included will be the Model 5246A 3 kVA UPS priced at $4,490, the model DSU710 available in power levels of 1,200 VA and 1,800 VA for a price of $1,910, and the model DLC AC line conditioner. The firm is located at 980 Buenos Ave., San Diego, Calif. 92110.

Instrumentation and Control

DALLAS – The E-PAC mini-micro uninterruptible power supply from .5 kVA to 75 kVA will be shown in Booth 1679 by Instrumentation and Control Systems, Inc., Electro-Pac Division, 129 Laura Drive, Addison, Ill. 60101.

Exide Power

DALLAS – Exide Power Systems Division of ESB, Inc. will introduce three uninterruptible power systems (UPS). The three static inverters (30, 60 and 100 kW) will broaden the Exide line in smaller UPS applications and will be seen in Booth 2050.

Digitally controlled, the step-wave inverter three-phase 60 Hz system allows 208 V to 480 V in or out; 50 Hz systems allows 380 V in or out.

System features include subcycle current control which corrects voltage every 700 μsec; steady-state voltage regulation, ±1%; instant fault clearing current; bumpless transfer of load; overload capacity 125% of rated kVA for 10 minutes or as high as 300% line-to-neutral current for 10 cycles.

Exide is at Rising Sun and Adams Avenues, Box 5723, Philadelphia, Pa. 19120.

Media Recovery

DALLAS – Media Recovery, Inc. is planning to demonstrate Shockwatch, a precision impact recorder for use with disk storage devices. The unit changes colors to indicate whether the disk has been subjected to a mechanical shock or force great enough to cause a malfunction.

Shockwatch will be shown in a variety of situations at Booth 1686. It costs $6 and can be obtained from Media Recovery at P.O. Box 867, Graham, Texas 76046.

Datapro Research

DALLAS – Datapro Research Corp. will introduce its "Report on Word Processing," a monthly updated information service, in Booths 1521 and 1523, the firm said from 1805 Underwood Blvd., Delran, N.J. 08075.

dc

Now available from Dearborn

30 day trial, free

dc

Any of the 4 DOS/RS Power Line packages listed below will work for you for 30 days without pay.

Judge the performance yourself. Risk free. You'll know just what you're buying in increased throughput and ease of operation . . . before you spend a dime!

This offer doesn't apply to SIM-14™ because it's backed by our unconditional satisfaction guarantee to run your 1400 work.

DOS/RS FULL™ : If you need three full processing partitions, and work with a core size of at least 128k, this merit-winning software may be the help you've been looking for.

It delivers six partitions. There's teleprocessing support, plus a built-in sophisticated spooler called Power-III.

With DOS/RS FULL you take advantage of 370 devices like 3330 disk drives. You enjoy new inter-partition scheduling flexibility, and throughput enhancements of such features as resident directories and transients.

A host of features are outlined in our free twenty-page reference manual. Send for it now.

DOS/RS FULL is available on permanent license, or monthly rental for as low as **$400.**

DOS/RS BASIC III™: If you need the super-spooling help of Power-III but use only two processing partitions; this subset of the full system may be ideal for you.

It offers multi-programming enhancements and inter-partition scheduling flexibility, but you only pay for what you need. As you add core and devices, it's easy to upgrade to the full system.

Permanent license, or monthly rental as low as **$290.**

DOS/RS BASIC I™: This software is perfect for the shop that's running one processing and one TP partition on one shift, and two processing partitions on other shifts.

Even with limited core, it permits you to share the efficiencies of multi-programming and spooling. Permanent license, or monthly rental as low as **$160.**

POWER-I™: When it comes to cost and core, this spooling software is as miserly as they come. Yet, it's generous in features: supports one or two partitions, offers early print start and is simple to install. It's upward compatible with Power-III. Permanent license, or monthly rental as low as **$65.**

SIM 14™ executes 1400 programs on any 360 or 370 under any operating system. It needs no hardware emulator features. Permanent license, or monthly rental as low as **$500.**

For specifications, call any Dearborn office or mail coupon to Schiller Park.

dc | dearborn computer company | dealer-IBM computers systems software leasing

4849 n. scott st., schiller park, ill. 60176 (chicago) 312/671-4410
toronto (416) 621-7060 • st. louis (314) 727-7277 • houston (713) 965-0788
detroit (313) 341-2123 • los angeles (213) 820-1097

Gentlemen: Tell me more about

☐ DOS/RS FULL ☐ DOS/RS BASIC III ☐ DOS/RS BASIC I ☐ POWER I ☐ SIM14

NAME/TITLE_____

COMPANY_____

ADDRESS_____

CITY/STATE/ZIP TELEPHONE_____

USE THAT SOFTWARE!

It's a funny thing about people who use software products. They like the systems that improve job turnaround, that work easily and reliably. When software does this, no one has to twist arms to get them to use it. If the system is difficult to apply, it doesn't get used.

EASYTRIEVE is one of the most useful software systems around because it is easy to apply in so many ways: one-time reports, mailing labels, print jobs, systems housekeeping, running jobs with a single macro command . . . and more. It works every time. No one has to tell people in an EASYTRIEVE shop to use the product . . . they love it because it gets them ahead of the workload and increases user responsiveness.

All Pansophic products are easy to apply and perform valuable DP functions for the IBM 360/370 environment. Pansophic is the leading systems software company dedicated to solving your software problems. Call or write today for further information on our complete line of proven software products.

PANSOPHIC

709 Enterprise Drive • Oak Brook, IL 60521
East (703) 821-8370
Central (312) 986-6070
West (214) 233-0486

Member SIA Software Industry

CI Notes

STC, Memorex Admit Talks, But Deny Merger Definite

SANTA CLARA, Calif. — Memorex Corp. and Storage Technology Corp. have reported discussions of a possible merger.

STC chairman and president Jesse I. Aweida noted that "at the present time we are in the early stages of discussions and no agreement, commitment or undertaking has been made nor can any assurance be given that the discussions will result in an agreement or merger."

Robert C. Wilson, chairman and chief executive of Memorex, issued a similar statement, calling the discussions on a possible merger "exploratory."

SBS Issues RFP

McLEAN, Va. — Satellite Business Systems (SBS) has invited U.S. satellite manufacturers to bid on the construction of three advanced, high-powered communications satellites for the SBS operational system.

The satellites are to operate at the higher frequency ranges of 12- and 14 gHz.

Proposals should be submitted by Aug. 8, according to the request for proposals (RFP).

Azurdata Sues MSI

RICHLAND, Wash. — Azurdata, Inc. has filed suit in the Federal District Court in Seattle, Wash., against MSI Data Corp. charging patent infringement.

The charge includes the recently introduced MSI/77 terminal.

Azurdata is seeking a declaratory judgment of invalidity and noninfringement of MSI Data's U.S. Patent No. 3925639.

Correction

Real Decisions Corp., a consulting company which recently received a contract from the Department of Housing and Urban Development (HUD), will have three months to supply the agency with a benchmark package for use in choosing a remote computer services vendor from those in the General Services Administration's Teleprocessing Services Program (TSP) [CW, May 16].

The technically qualified vendor who comes out on top in the benchmarking procedure will provide computer services to HUD for 36 months.

During the first 18 months, the agency will develop the programming for its mortgage insurance accounting system. The TSP vendor's services will be required during the second 18 months to operate the system.

Cites International Threats

Roth Proposing Cabinet Post for Trade

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Sen. William V. Roth Jr. (R-Del.) has called for the creation of a new Cabinet-level Department of International Trade and Investment because he believes the U.S. has suffered long enough from an "outmoded, ill-defined" international economic apparatus.

"We must act to coordinate and focus our strength or we will be outguessed, outflanked and outmaneuvered by the competition," Roth told a recent meeting of the Western Electronics Manufacturers Association (Wema) here. Many Wema members are U.S. semiconductor companies who have been hard-hit in recent months by Japanese firms staking out U.S. memory and microprocessor markets, a spokesman for the association said.

Roth will introduce legislation sometime next month with the objective of creating "an effective, coherent foreign trade policy" to deal with such trade issues as the profusion of Japanese electronics exports to the U.S. and restrictive Japanese import practices.

His bill would establish an executive department incorporating:

- The President's Special Trade Representative and his office.
- The international business and export control functions of the Commerce Department.
- The antidumping, countervailing duty and customs administration functions of the Treasury Department.
- The trade agreements and commercial opportunities functions of the State Department.
- The statistical reporting work of the International Trade Commission.

The Export-Import Bank of the U.S. and the Overseas Private Investment Corp. are also included in Roth's proposal as semiautonomous bodies in order to align their activities more closely to general U.S. trade policies and programs.

Roth hopes his bill "will streamline foreign trade and investment policy. It will centralize our vast resources and the information you need in planning corporate initiatives in this area," he told Wema's members.

Sen. William V. Roth Jr.

"By providing a clear locus of authority for decision making in international trade and investment policies, we will be strengthening this country's ability to be a tough bargainer in negotiations with our trading partners," he added.

The senator believes his plan is consistent with the Carter Administration's stated objectives "to make government more responsible to the society it serves and to consolidate governmental bureaucracy."

In the meantime, Roth called on the Administration to "take whatever steps are necessary to ensure that the Japanese government, in coordination with the Japanese industrial sector, reduces barriers to fair trade."

These steps should include simplifying import regulations, ensuring the integrity of patented products, honoring antidumping regulations and reducing internal distribution barriers, Roth said.

Services at Issue

Adapso, Members Sue Citibank

By Toni Wiseman
Of the CW Staff

NEW YORK — The Association of Data Processing Service Organizations (Adapso) and six of its largest member firms have filed suit here asking for a declatory judgment against Citibank N.A. and the U.S. Comptroller of the Currency.

The complaint, filed in the U.S. District Court for the Southern District of New York, asked the court to issue a permanent injunction restraining Citibank from selling or leasing DP services and the Comptroller from authorizing national banks to sell such services.

The Adapso suit claims that interpretive rulings by the Comptroller violate the National Bank Act and the Bank Service Corporation Act because neither authorize banks to sell computer services to the public.

In its citation, Adapso said Citibank, presumably acting under the asserted authority of the Interpretive Ruling by the Comptroller, announced its intention in December 1976 to offer computer time-sharing services to business firms.

Citibank subsequently advertised that it would market such services at 50% of the prevailing charges, indicating an intent to market the services on an incremental basis, Adapso said. Citibank also advertised its intention to make available financial application packages and a data communications network capability, the association added.

As a result of Citibank's move into commercial time-sharing services and the Comptroller's interpretation of the banking acts, the computer services industry faces illegal competition at "ruinously low prices

(Continued on Page 55)

IBM Pricing Depressed Market, Hurt Industry Margins: Broker

By Molly Upton
Of the CW Staff

NEW YORK — Computer stocks hit new lows after IBM moved to "close up its price umbrella"—and the depressed prices may well remain through the second quarter, according to Harry Edelson, vice-president of Drexel Burnham & Co., an investment firm here.

By leapfrogging some of its prices into the competitive range occupied by other mainframers, IBM reduced not only its own profit margins, but those of the other firms as well, Edelson said.

IBM had the largest profit margin to start with — 26% — followed by Data General Corp. (23%), Burroughs (17%), Digital Equipment Corp. (14%), Univac (8%) and NCR (6%), he added.

Although Burroughs, with a larger margin than the other mainframers, has announced an average of 20% price reductions on its large machines, the other firms have "played it close to the vest," Edelson said.

These firms pretty much held the line for a while, then made selective cuts, he noted, adding he expects them to continue making selective cuts as needed.

"Any company can keep pace with IBM on product development; it's a matter of whether they can keep the price umbrella where it was before. If the price umbrella narrows, they possibly stand to lose some business and, also, elasticity of demand is not going to take effect at the high end as

(Continued on Page 54)

600LPM
$6000
OFF!

CALL TODAY TOLL FREE! 1-800-243-9054

Look at the numbers.
It's as easy as 1-2-3.

1 Digital Equipment Corporation's 600LPM line printer costs more than $18,000, and is usually delivered in 120 days or more.

2 Digital Associates Corporation sells the SAME 600LPM line printer for $12,000, and gives you delivery in 30 days or less. You also get the full printer system, with controller and installation anywhere in the United States, and it's compatible with DEC, Data General, DCC, HP, Interdata and other mini-computers.

3 It's this simple! You save at least $6,000, and at least 90 days in delivery time!

Digital Associates Corporation
The largest selection of 100-1000LPM line printers in the world.
1039 E. Main Street, Stamford, Ct., 06902. (203)327-9210

BASF to Put Toe in OEM Waters at NCC Next Week

By Toni Wiseman
Of the CW Staff

BEDFORD, Mass. — BASF Systems will be signaling its tentative entry into the minicomputer OEM hardware field in the U.S. when it introduces the Model 6106 mini floppy disk drive at the National Computer Conference (NCC) in Dallas next week.

The 6106 was functionally designed for the standard 5.25-in. floppy disks. The single-density disk has a track-to-track access time of 20 msec with head loading time of 35 msec, according to BASF.

The drive can transfer up to 125 kilobits of information per second, the company added.

BASF has had hardware in the past, such as disk drives and controllers back in the 1969-1970 timeframe. When IBM cut its prices and a large number of competitors entered the field, however, it took a second look and decided that market wasn't for it, according to John Healion, director of marketing for computer and business products.

As a result, BASF is known only as a major supplier of magnetic tape and disk media in the U.S., while its parent company in Germany, BASF AG, markets both hardware and media in Europe.

Three-Stage Evaluation

BASF is currently in the second phase of a three-stage evaluation program to guage the level of market acceptance for the main drive before actually adding it to its U.S. product line, Healion said.

In the first phase, BASF interviewed representative members of various application groups to judge whether the device makes sense for that application. These groups represent point-of-sale (POS), electronic funds transfer (EFT), desktop computers and word-processing applications.

This study showed that word processing, tabletop computers and hobbyists will be good markets for the mini flexible disk, either because of its low price or because of its size, he said. POS and EFT are looking for more storage capacity than the disk offers, he noted.

"We're not looking for replacement markets," Healion said, "but for new items to create on new markets."

The current second phase of the evaluation is an expansion to investigate potential market areas in more detail and to determine potential volumes to which accounts and through what distribution methods.

If interest at NCC supports BASF's thesis that there is a viable market for the disk, the third phase will be to set up a manufacturing and marketing structure for the new products, Healion said, neither of which will cause any great problem.

In fact, to speed up initial deliveries, the products could be imported from Germany to allow immediate marketing while the firm gradually implements manufacturing capabilities.

"One of the reasons, advantages, of starting off with a device like this mini drive is that all the development, the up-front frustration, has already been done in Germany," he said. This will eliminate a lot of the tooling and dieing problems and costs as well, he noted.

"To be successful in the OEM market in the U.S., the product has to be manufactured here," Healion said, noting one reason for this is that competiton is much keener than overseas.

Facing Competition

BASF will be facing competition from Shugart, Wangco and Diablo if it decides to go ahead, but it has not formulated a marketing strategy as yet.

BASF views this venture as the initial phase of expanding its line in terms of developing into bigger, more sophisticated devices.

BASF AG, for instance, has been working with plated disks for video applications for accounts interested in very high capacity, and has over five years' experience that is available to all BASF subsidiaries, he noted.

Healion sees a major strength for BASF in its ability to manufacture both the peripheral device and the media.

"The OEM is a very sophisticated market, highly technical. You have to design your media to perform at peak on the drive, and you have much more control over that performance if you manufacture both products," he said.

It's also easier for the OEM to deal with one supplier, rather than two, he added.

IBM Moves Depressed Stocks: Broker

(Continued from Page 53)

quickly as at the low end," Edelson said.

"It's certainly not the end of the computer business, but it will hurt profit margins," he stated.

Although minicomputers, with declining prices, have proved the market is elastic and expands with decreasing prices, this phenomenon is less likely to occur with large machines, he noted.

One reason is that large users don't generally have the manpower and the additional investment required to support more large mainframes, he explained.

Long Depression

The computer industry's stocks are extremely depressed and this is one of the reasons the whole stock market has been depressed because IBM is something of a bellwether stock, Edelson said.

For the first time ever, IBM has had over a 4% yield; the stock went below 250 and it pays dividends of $10, he pointed out.

A lot of people think IBM should gain some support on a yield basis, but earnings will not be good for IBM in the second quarter; it's a tough comparison since it had such a good second quarter last year, he explained.

Burroughs also could have difficulty then, and these two are the bellwethers of the group.

It's thus very possible that stocks for the industry as a whole could remain depressed through the second quarter, he said.

IBM will be looking much better next year since it will be shipping the 3033 plus possibly an unannounced replacement for the 370/158, and it will still be shipping the 138 and 148 in volume as well as the System 34 and everything else, Edelson said.

Generally IBM has stronger periods the year after the introduction of major products, he added.

By August or September, investors will be looking at some attractive stocks in the computer group, whereas Edelson is not sure the downward pressure will abate in the near term.

Incentive to Buy?

Although the purchase price cuts might encourage people to buy systems, this incentive is offset by a couple of factors, Edelson observed. People will either postpone delivery of a 168 and wait for the 3033 or will rent — not buy — a 168 until the 3033 is available.

Where IBM will really feel the effects of its price cuts is in the smaller checks it will receive for systems on rent, Edelson indicated. Rental revenues account for two-thirds of IBM's total revenues, he said.

And it will be a while before elasticity of demand takes hold and users start buying more memory at the new, lower prices.

"That will be the major reason for the downturn in earnings estimates," he said. Drexel Burnham is forecasting $17.40 for IBM this year and over $20 next year in comparison with $15.94 last year," he said.

"We don't look for a great year for IBM. We still recommend it as a buy, but we caution that IBM will probably not outperform the market in the near term," he added.

The lows hit by the computer stocks are not unique to that sector, he said, since the moves fit in with the pallor of the stock market as a whole, Edelson contended.

"There was already a negative climate when IBM made its price reductions," he said, commenting on the unfriendly mood toward high growth stocks.

Only Honeywell, which receives a major portion of its income from the controls business, has remained relatively unscathed on the stock listings, he said.

IBM hit a new low since at least a year ago, and DEC and DG approached their lows, he said.

Contracts

International Telephone and Telegraph Corp.'s Defense Communications Division has been awarded a $36 million first-phase contract by the Air Force Electronic Systems Division to design and provide the functional prototype of the Strategic Air Command Total Information Network.

Computer Sciences Corp. has been awarded three contracts, a $20 million contract from the Department of Defense for systems engineering and integration; a $3 million support contract from the Energy Research and Development Administration; and a DP management contract from the Environmental Protection Agency.

International Business Machines of Manassas, Va., has received a $3 million cost-type letter contract from the Naval Air Systems Command for P-3 advanced signal processor display and control systems units.

CALL US

Greyhound Computer Corporation

Available Immediately for Lease:

360/30, 360/40, 360/50, 360/65's

Greyhound Phoenix ICA's

U.S.	East	Tom Ryan	(617) 272-8110
	Central	Jerry Smith	(312) 298-3910
	West	Dave Hyland	(415) 283-8980
International	Canada	Don Maunder (Toronto)	(416) 366-1513
	Mexico	Andres Contreras	(905) 543-6850
	Eurasia (U.S. inquiries)	Don Haworth (Dallas)	(214) 233-1818
	U.K./Europe	Joe Gold (Geneva)	(022) 61-27-54
	Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
Non-IBM:	UNIVAC or) CDC only)	John Hallmark (Dallas)	(214) 233-1818
		Don Haworth (Dallas)	(214) 233-1818

ROYTRON™

plug-compatible reader/punch

Desktop combination reader/punch with serial asynchronous RS-232C compatible interface. Designed to operate with a terminal device on the same serial data lines or alone on a dedicated serial line. Reader will generate data at all standard baud rates up to 2400 baud.

Punch accepts data at all standard baud rates up to 600 baud continuous or 4800 baud batch, utilizing a 32 character buffer.

Two modes of operation are provided *Auto Mode* — Simulates Model ASR 33 Teletype using ASCII defined data codes (DC 1, 2, 3 and 4) to activate/deactivate the reader or punch, *Manual Mode* — Code transparent mode. Panel switches control activation/deactivation of reader or punch and associated terminal device

Tape duplication feature is provided by setting unit to LOCAL mode.

MODEL 1560-AS

High-speed, compact, with self-contained electronics and power supply Complete in attractive noise dampening housing.

NCC BOOTHS # 1000-1002

For full details, write or call us.

SWEDA INTERNATIONAL, INC.

Litton O.E.M. Products

34 Maple Avenue, Pine Brook, N J 07058/(201) 575-8100

IN U K — ADLER BUS. SYSTEMS/OEM PRODS., Airport House, Purley Way, Croyden, Surrey, England

IN FRANCE — SWEDA INTERNATIONAL/OEM 103-107 Rue de Tocqueville, 75017 Paris, France

CASH 3420 tape drives COMDISCO®

9701 W. HIGGINS RD.
ROSEMONT, ILL. 60018
(312) 698-3000

Calls Tax Reform the Answer

Conable Urges Risk Capital Promotion

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Congress needs to examine the whole problem of capital formation rather than deal with a tiny part of it every time there is a tax reform bill, according to Rep. Barber B. Conable Jr. (R-N.Y.).

The ranking Republican member of the House Committee on Ways and Means, which considers taxation legislation, said that in the meantime Congress might try to get more reasonable depreciation rules and lower interest rates to encourage the generation of risk capital.

Speaking before a recent meeting of the Western Electronics Manufacturers Association (Wema) here, Conable indicated these measures constitute no more than "the wise use of capital.

"I would trade away the investment tax credit in a minute for more reasonable depreciation rules than we have now," he told Wema members. In the past, Conable has generally supported the tax credit "because I had no other alternative."

Changes in the depreciation schedules and lower interest rates would help prevent funds from being tied up in capital goods for so long, Conable suggested. Lower interest rates would have the added advantage of encouraging people to save and invest in hopes of getting more back in the long term than they would by purchasing goods.

Current interest rates are so high that the public can't see that savings or investments are worthwhile, he said.

"We give lots of lip service in Washington in favor of capital formation," Conable stated. But when all was said and done in passing the Tax Reform Act of 1976, he noted, Congress increased and tightened the minimum tax, which has the effect of increasing the long-term tax on capital gains.

Biggest Public Danger

The biggest danger to the public and to business is that "the average congressman doesn't know what's going on" in this area, Conable said. Most thought the minimum tax would be a splendid device "for catching the few big fish who swim through the net."

Few considered the drastic effect the measure would have on risk capital formation, he added.

The House Ways and Means Committee formed a Task Force on Capital Formation, chaired by Rep. Al Ullman (D-Ore.), who also chairs the committee, to examine the overall pattern of capital formation, Conable told his audience.

The business community should stay in touch with this task force and with individual members of Congress. Too often, business people are "activists in this area only when they feel threatened," the congressman said.

The total tax burden is the problem behind the difficulties associated with raising risk capital, in Conable's view. But the only way to reduce this burden is to "reduce our expectancy of government," he said.

"We will be tricked if we think it can all be done with mirrors," he added. Many believe if Congress just cuts taxes a little more, the country will have more capital to work with, Conable said, adding that this was the thrust of President John F. Kennedy's tax cut program in 1963.

Such a cut may not have the desired effect on today's economy, he suggested. There is some question whether Kennedy's program generated more capital in the 1963-64 time frame, given the potential influence of such factors as the Vietnam War, Conable said.

The issue of capital formation is the key to the operation of the economy. Without risk capital, there can be no measured growth of the economy, Conable stated. "The problem with a riskless society is that it's a choiceless society," he said.

Rep. Barber B. Conable Jr.

Conable said President Carter remains "the great imponderable factor" in the tax/capital formation future of the nation. The Treasury Department is working now to come up with a tax package by July or August, the congressman noted.

Adapso Files Against Citibank

(Continued from Page 53)

for which we cannot compete," according to Jerome L. Dreyer, Adapso's executive vice-president.

Adapso members and others in the industry face "irreparable injury to their business from the illegal competition of Citibank and other national banks which may follow Citibank's lead," he added.

Bernard Goldstein, chairman of Adapso's Bank Relations Committee, said Citibank's intention to sell services at half the normal price is a digression from the manner in which banks compete among themselves and could be construed as a "predatory attempt" to destroy or dominate the services industry.

The services industry market is estimated at $5 billion to $6 billion. Goldstein could not estimate the market share which might be lost to Citibank, but said "if all banks in the U.S. follow, it would seriously injure our industry."

He also indicated that, in the historic sense, banks have not been very successful in market penetration because of the fitful nature of their participation, entering and then abruptly exiting. He cited Citibank's recent sale of its payroll application to ADP Network Services as an example.

Robert Weissman of National CSS stated that "we are not worried about another competitor in the field, but we believe the concept of maximum separation is critical and banks, by their nature, have the power and ability to compete in a way to which we cannot respond."

The Comptroller, he noted, has been named as a codefendant because the issue is important not only to Adapso, but to other industries as well who may compete with banks.

Joining Adapso as coplaintiffs are ADP Network Service, Comshare, Inc., National CSS, On-Line Systems, Inc., Quantum Computer Services and Tymshare, Inc.

Citibank Comment

In response to the filing, Citibank issued a statement noting it is selling excess computer capacity on a time-sharing basis, "an activity permissible for national banks under existing laws and regulations.

"We believe this activity is a sensible and economical use of the excess capacity that banks must maintain to assure timely processing during peak periods," Citibank stated.

The bank said its prices "reflect the full cost of providing time-sharing services to outside clients plus a reasonable profit."

Nickels & Dimes

Datapoint has filed an application for the listing and trading of its common stock on the New York Stock Exchange. Datapoint stock is currently traded over the counter.

$$$

Atlantic Research has redeemed Susquehanna Corp.'s 84% ownership and for the time being the corporate ownership will reside in 10 members of upper management.

$$$

Cray Research has negotiated a $10 million revolving line of credit with five banks in Minneapolis and St. Paul. The funds will be used for construction and installation of computer systems.

Amdahl paid its first dividend of 5 cents a share on April 29.

$$$

Data 100 has arranged a $45 million five-year term credit agreement with a consortium of 11 banks, replacing a $41.3 million North American revolving bank credit agreement.

$$$

Bergen Brunswig plans to discontinue its Health Application Systems line of business to halt the drain on consolidated results.

$$$

Centronics plans to buy up to 100,000 shares of its common stock on the open market.

MANUFACTURERS/DISTRIBUTORS

MAXIMIZE YOUR PROFITS & FINANCIAL RESOURCES

We specialize in third-party lease programs tailored to support your operating lease and/or governmental fiscal funding lease marketing requirements.

INTECH LEASING CORPORATION
540 Madison Avenue
New York, N.Y. 10022
(212) 688-8400

INTECH MIETE GMBH
Starkenburgstrasse 11-13
6082 Morfelden
West Germany
(06105) 21081

20-30% Discounts
on Data General's new
CS/40 COBOL
Mini-Computer
with

- Accounts Receivable
- Accounts Payable
- General Ledger
- Order Entry/Inventory Control
- Sales Analysis
- Invoicing
- Payroll

End User and Distributor/OEM Inquiries Invited

Call today (213–658-8122) or use the coupon below.

MCBA
MINI-COMPUTER BUSINESS APPLICATIONS, INC.
6420 WILSHIRE BLVD., SUITE 950
LOS ANGELES, CA 90048

Please send me CS/40 discount information.

Name _____
Company _____
Address _____
City _____ State _____
Zip _____ Phone _____
CWX123

announcing . . .
a three-day conference on planning and efficiency in EDP. . . and how you can achieve it!

System Planning and Performance Evaluation

presented by: University Sciences Forum and: COMPUTERWORLD

New York Hilton • June 20—22, 1977*

Find the solutions to your resource planning and utilization problems through actual user case studies, presentations by EDP performance evaluation experts, interaction with other D.P. Managers and Senior Technical Personnel, and discussion with leading suppliers of hardware and software monitors and optimization tools.

Who Should Attend

- Vice Presidents of Data Processing and MIS, Controllers, EDP Auditors, Directors of Data Processing, Systems Analysts, and EDP Consultants
- Anyone responsible for EDP resource planning or for monitoring/improving the performance of an organization's EDP Systems.

Conference Highlights

DAY 1: Laying the Groundwork
A solid foundation for performance evaluation and measurement.

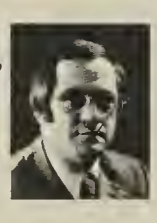
DAY 2: Users' Experience; "Real World" Tools
The experience of other users and what the vendors currently offer.

DAY 3: Putting It All Together
Problem-solving workshops using real data in a sample problem.

Conference Speakers

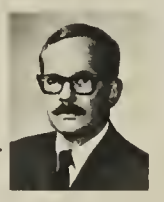
Conference Chairman
Saul Stimler,
Author, Lecturer, Consultant
President, Stimler Associates

Dr. Jeffrey P. Buzen,
Vice President,
BGS Systems, Inc.



George P. DiNardo,
Vice President/
Information Processing
Mellon Bank

Philip A. Greco,
Vice President/
Information Systems
Pneumo Corporation



J. Curtis Gwilliam,
Manager,
Norwich Data Center
Norwich Pharmacal Co.

Phillip Howard,
Editor,
EDP Performance Review
Founder/President,
Applied Computer Research

Charles Philip Lecht,
Author, Lecturer, Consultant
Pres./Chief Exec. Officer
Advanced Computer
Techniques Corporation

Michael F. Morris,
Management Consultant by
Executive Appointment to the
Comptroller General of the
United States

About the Sponsors

Computerworld is the leading newsweekly for the computer community; and **University Sciences Forum** is a national, public concern, non-profit organization headquartered in Washington, D.C. The Forum and its membership are dedicated to education and research and is composed of professionals and associates who are recognized experts in their fields. The Forum provides expert teams to perform information systems analysis and design studies, surveys and statistical analyses, legal research, modeling and simulation, indexing and abstracting, and professional development seminars and courses.

Cost . . .

$395 per person. Companies may send teams at a cost of $350 per additional attendee. *Early Payment Offer: send us a check by June 3 and deduct $25 per attendee!*

Accommodations . . .

A block of rooms has been reserved at the New York Hilton for conference attendees. Reservation forms will be mailed to you with confirmation of your registration.

***Registration:** Sunday, June 19,1977 4-7 p.m.

For more information call *COMPUTERWORLD* at 800-225-3080.

Registration Form

Fill out and send to: Ed Bride, **COMPUTERWORLD,** 60 Austin Street, Newtonville, MA 02160

Please reserve_____spaces at the
System Planning and Performance Evaluation Conference
for my company.

☐ Payment of_____is enclosed. ☐ Please bill me.
(See early payment offer!)

Organization Name and Address

_____

_____

_____

_____

Registrant Names

_____

_____

_____

_____

Undergoing 'Rational Growth'

Data 100 Offering Full Terminal Line

By Ann Dooley
Of the CW Staff

MINNEAPOLIS – Data 100 Corp., a company that began as a single-function batch processing operation, has grown into a distributed DP firm offering multifunction terminals.

"We give our customers the chance to evolve their facilities along with Data 100," according to Bob Bernstein, director of product marketing.

They can go from remote batch to disk to interactive on-line, which is just the way Data 100 has progressed since its beginning, he said.

Data 100 began in Europe at the same time it started in this country in order to implement an international base for its large multinational customers, Bernstein said.

The company sells and services in 27 countries since customers prefer dealing with Data 100 directly in the country in which they are located, he added.

In addition to an international base, Data 100 has developed a third-party leasing structure. "Originally, we did it to be competitive with IBM and now we are able to work from a mature lease base," Bernstein said.

About 50% of Data 100's product line is key batch and, at the same time, the firm manages to have 25% of the remote batch terminal market, the company claimed.

"We offer our customers a price/performance consideration that is better than IBM," Bernstein said.

Data 100's newest product on the line, the multifunction Model 82, provides remote batch, data entry with remote batch and an on-line capability with everything else, according to Bernstein.

The company is undergoing a very "rational growth" period, Bernstein said. "We're migrating away from hardware and 55% to 60% of our budget is spent on software," he said. "That's where it's at today," he added.

"Most of the hardware is done and it's just getting the software and then implementing the new technology," Bernstein said.

Customer response has been favorable to Data 100's additive approach, he noted. Little or no retraining or software changes are needed when an additional function is added, he explained.

"Nearly 80% of our orders are from our installed base and we are pleased with that," he said. The customers obviously like what Data 100 is doing for them.

"What many people don't realize is that Data 100 is also a peripheral company. We have a heavy investment in line printers and we manufacture all our own peripherals.

"It's been one of our goals to manufacture as much of our own equipment as possible in order to maintain control," Bernstein said.

"Data 100 is a highly vertically integrated company," he added.

The company is working to understand the needs of the remote user who might be miles away from the host computer, Bernstein said.

"We plan to add more function, capability and intelligence while concentration on batch and remote business will continue to remain very strong. "It won't mean a lessening of our classical products, either," he said.

In 1976, revenues were $121.9 million, up 27% from 1975, according to company figures.

"Almost 61% of our revenues come from Fortune 500-type users, Bernstein added.

Data 100's customers are large, international companies with widely separated divisional headquarters, he said.

Applications range from basic financial and administrative DP for a mining and manufacturing company to determining the weight, horizontal and vertical wave loads and stress relationships that can be tolerated by marine structures for an engineering and construction firm, Bernstein said.

Right now, the demand from the market is larger than the industry can satisfy, he said. It's a buyer's market and the user has a large number of companies to choose from, he added.

"IBM is the top competitor and all others just pale in comparison," Bernstein said.

Data 100 is second to IBM in the batch terminal market, he said. "It's always easiest for the user to go with IBM so we answer by underpricing them and offering competitive service."

Market Strategy

Data 100's strategy is to only develop products as the market or their customer's needs require. The concentration is on marketing rather than developing new technologies.

Since many of the firm's customers use IBM mainframes or other equipment, Data 100's products must remain compatible and be as or more efficient than IBM products, the company claimed.

Functions are being repackaged and used in different functional mixes, Bernstein explained. The company can tailor installations to the individual user's needs by configuring standard off-the-shelf products, he said.

"We plan to continue offering this kind of multifunctioning line for the growing distributed DP market at least through the next decade," Bernstein said.

SI Aiming More at End Users

By Esther Surden
Of the CW Staff

SUNNYVALE, Calif. – System Industries (SI) is finding itself more and more in the end-user marketplace with its Digital Equipment Corp.- and Data General Corp.-compatible disk systems, according to Kent Winton, vice-president of marketing for the firm.

Previously, the firm had not pitched to the end user who needed support, Winton indicated. But "over the last two years we've built up our service capability and can keep up" with end-user needs, he said.

SI now has service centers in New York, Cincinnati, Chicago, Toronto, San Francisco, Los Angeles and Orlando, Fla., staffed by about 20 people trained on what Winton described as the company's "simplex product line."

That way the service people are specialists and can effectively deal with the product maintenance rather than generalists who must know many products, he said.

The company recently slashed prices on its disk products by about 15%, Winton noted, because of a new contract SI signed with Control Data Corp. The contract allows the firm to pass significant savings on to the user, he added.

Orders & Installations

The Ohio College Library Center is installing the first four-processor Tandem Computers, Inc. nonstop computer system. The four interconnected processors will provide single-point network control supervision and eventually nonhost computer connections for the center's telecommunications network.

Automation Electronics, Inc. has ordered 50 Honeywell Information Systems, Inc. Level 6 minicomputers to be packaged with its Autotron programs for radio stations.

Systems Design & Development Corp. of Boulder, Colo., has installed one of the first IBM Series 1 minicomputers in the Rocky Mountain region. The firm is developing program products for marketing with the Series 1.

McDonnell Douglas Corp. has ordered 13 Systems Engineering Laboratories SEL 32/55 systems to serve as the heart of the Air Combat Maneuvering Simulator Device 2E6, which has been designed for sharpening naval aviation aeronautical skills and developing combat strategy.

General Warehouse Corp. has ordered a Univac 90/30 system for order entry, inventory control and for control of warehousing and trucking operations.

Health Management Services, Inc. has ordered 100 Honeywell Level 6 minicomputers to provide DP services to hospitals and insurance operations in a distributed systems environment.

Houston Natural Gas Corp. has installed an Electronic Memories & Magnetics, Inc. 345 add-on memory to supplement its IBM 370/145 system.

The Internal Revenue Service has ordered 288 Burroughs Corp. on-line S1200 document encoders and related equipment to speed taxpayer remittance processing.

Avakian Systems Corp. has ordered 1,000 Micromind II microcomputer systems from ECD Corp.

The Westinghouse Corp. has ordered 45 Qantex Model 2200 dual-cartridge data storage systems which, using two 3M Co. Model DC300A data cartridges as tape to media, will each provide 5.7M bytes capacity for use as program storage in Westinghouse milling machines.

Raleighs, a Washington, D.C., fashion apparel chain, is installing NCR Corp. 2151 programmable retail terminals in its 10 stores.

The U.S. Navy has ordered five MK 86 shipboard weapon control systems from Lockheed Electronics Co., Inc.

The Greater Cleveland Regional Transit Authority has ordered a Basic/Four Corp. system for scheduling and management control of its Community Response Transit operations. Computer/Dynamics, Inc. of Cleveland will design and install the system.

The State University of New York at Buffalo has installed a Control Data Corp. Cyber 173 to replace the CDC 6400 it has been using for eight years.

IT'S HERE NOW
DESIGN 2400 BY MI²
180 cps KSR PRINTER

HI SPEED
RELIABLE
QUIET

HAS ALL YOU WANT & MORE
LEASE
RENT
OR BUY

DC DATA COM
For Info Call (714) 540-8553
DATA COM
1844 Carnegie
Santa Ana, CA. 92705

Terminals Terminals Terminals
Six Month Warranty On Purchase Of All Equipment*

Full Line of DEC Terminals
DECwriter II LA – 36 ..... $1645
DECwriter III LS – 120 2995
DECprinter I LA – 180 2795
DECscope VT – 52 1795

Full Line of TI Terminals
745 portable U/L case $1875
733 KSR 1595
733 ASR dual cassette 2895
810 wide carriage R/O 2100

Diablo HyType II Terminals
1620 with forms tractor $2895
1610 receive only 2600
optional stand and basket 135

- Full line of CRT's, peripherals, and rebuilt portables
- Rental, lease plans and quantity discounts available
- Service by Data Access Systems or manufacturers
- Optional features installed without charge

*In DAS Service Areas
DAS
DATA ACCESS SYSTEMS, INC.
100 Route 46, Mountain Lakes, N.J. 07046
(201) 335-3322
Branch Offices: Boston (617) 933-8822 | Virginia (703) 525-2924

Take Your Pick!

Wherever you want to be . . .
The 1978 Computer Caravan
will be there.

Take your pick . . .
the Computer Caravan will be there.

The 1978 Computer Caravan tour gives you coast-to-coast coverage of the nationwide computer market. The Caravan, a series of Regional Expos visits nine major market areas across the country attracting buyers of products and services of the computer industry. These Expos allow a salesman to work within his territory, bringing his prime prospects into his own showroom/sales office.

Whatever your marketing needs . . . to identify prospects, to introduce new products, to train new sales staff, or to actually close sales, the Computer Caravan does it for you.

With our traditional Exhibitor Service Package, we handle all of the details for one price. This package includes 100 square feet of exhibit space, a standard booth, carpeting, header sign, furniture, electrical power, imprinted guest tickets, drayage, set-up and tear-down, and booth cleaning and security.

If you wish you can rent 100 square feet of floor space and use your own booth. This option includes guest tickets, a booth sign, cleaning and security, standard drapery background and side rails.

If you don't need a full booth to tell your story, a mini-booth is available in our Gallery Presentation Area.

Whatever your needs . . . Put your product or your story in front of thousands of prospects in your marketing area.

RETURN TO: THE CONFERENCE COMPANY INC.
COMPUTER CARAVAN DIV. 60 AUSTIN ST. NEWTON, MASS. 02160

Please send more information on exhibiting in the cities indicated.

☐ **Southern California Computer Expo**	**Anaheim**	**March 21-23**
☐ **Northwest Computer Expo**	**San Francisco**	**March 28-30**
☐ **Southwestern Computer Expo**	**Houston**	**April 11-13**
☐ **Southeastern Computer Expo**	**Atlanta**	**April 18-20**
☐ **Gateway Computer Expo**	**St. Louis**	**April 25-27**
☐ **Midwestern Computer Expo**	**Chicago**	**May 2-4**
☐ **Mid-Atlantic Computer Expo**	**New York**	**May 9-11**
☐ **Great Lakes Computer Expo**	**Detroit**	**May 23-25**
☐ **New England Computer Expo**	**Boston**	**May 30-June1**

NAME _____

COMPANY _____

ADDRESS _____

CITY, STATE _____

TELEPHONE _____

TI Sees Bubbles Good Mass Memory — But Not for the Masses Until '80s

By Toni Wiseman
Of the CW Staff

DALLAS — Bubble memories are no longer a laboratory fantasy; they are a commercial reality since the introduction of Texas Instruments' TI 765 teleprinter that uses bubble technology for mass memory storage [CW, April 25].

But even TI admits bubbles will not be a major force in the storage market before the early 1980s because of the current high costs.

Bubble memory will impact two separate markets, the replacement market and the microperipherals market, according to Dr. Michael H. Valek, manager of the Magnetic Bubbles and Semiconductor Group.

Magnetic bubble memory (MBM) will undergo an 80% price reduction as a result of learning curves in terms of processing and packaging in the near future. By 1980, MBM will be able to compete on a price basis with all floppies and a large percentage of the fixed-head segment, Valek predicted.

MBM has a lower access time, simpler interface and is less expensive than moving-head disks, but it is not removable and has a lower transfer rate and a higher price per bit. The same advantages and disadvantages hold true for floppy disks, Valek said.

Compared with MOS random-access memory (RAM), MBM's advantages include nonvolatility, a greater density and a lower bit price. MOS RAM, however, offers lower access times and transfer rates and simpler interface.

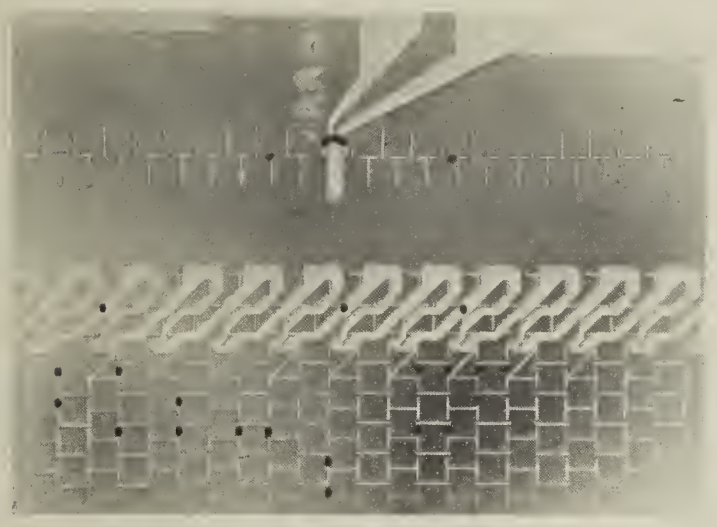
Finally, compared with charge-coupled devices (CCD), MBM offers nonvolatility and greater packing density, but again a higher access time and lower transfer rate.

Ideal Applications

This means that bubbles are ideally suited to serial auxiliary memory applications where nonvolatility is essential, whereas CCDs are better suited to virtual memory applications where there is a need for high performance but volatility is tolerable, Valek said.

The two technologies will never overlap in terms of applications, he noted, so companies which are ignoring one in favor of the other are missing out on the chance of a huge market.

MBM is highly microprocessor-compatible, Valek indicated. It offers small size (1M bit in 20 cubic inches); modularity (100K-bit increments); low entry price; compatible packaging (single PC board); simple, low-cost interfacing (an LSI custom interface will be available in the fourth quarter); and a low transfer rate (50 kbit/-sec).



TI Bubble Memory

MBM is also nonvolatile, has an access time of a few milliseconds, has low power dissipation and can be removable, but at a high cost, Valek said.

TI is currently offering the PC board, bubble memory and custom MOS controller. The board and bubble sell for $250, the prototype controller for $150.

TI put an appreciable amount of money into producing a viable commercial product — some industry figures have estimated $7 million of the company's own funds in addition to $3 million in government grants.

Valek noted that the multichip approach which has been used by firms such as Rockwell International for military applications gives a density advantage, but has severe cost problems which essentially make it difficult to implement in a low-cost/high-production mode.

"All the chips have to be magnetically matched, which is not consistent with high-volume production because rework is extremely difficult," he said. "Also, a single chip package is much more flexible."

The most exciting applications for MBM will be in areas where it will permit users to do things which are simply impossible today, Valek said, because the cost or size of using a disk drive is prohibitive. These include applications in intelligent terminals, point-of-sale devices and programmable calculators.

Microcomputers with MBM will have the availability of low-cost mass storage, he said, noting the price of MBM should drop to 10 millicent/bit by 1980.

By 1980, the MBM market should grow to more than $100 million annually. "But the requirements for computer memory are increasing drastically and will continue to do so through 1985. So the other media will not go out of business and will continue to grow as well and will remain competitors," Valek stated.

"But an appreciable part of those requirements will be served by bubbles and CCDs," he added.

Fiche Credited With COM Growth

DALLAS — Acceptance of microfiche is a primary reason that computer output microfilm (COM) is the fastest growing segment of the micrographics industry, the president and board chairman of Quantor Corp. recently told members of the Dallas-Fort Worth area financial community.

Charles Askanas noted that fiche — rectangular sheets of microfilm, 4- by 6 inches in size — has been accepted by the DP industry as the "optimum medium for recording data on film."

$403 Million Sales

According to Askanas, COM is easily the fastest growing segment of the micrographics industry, with worldwide sales of $403 million during 1976. The COM world market is expected to top $1 billion in sales in 1980, he added.

Calling COM "a segment of the DP industry," he said it benefits DP users in five ways: reduced cost, rapid information storage and retrieval, speed of computer output, ease of handling and storage and ease of distribution.

Fiche Acceptanee

Fiche, he added, has achieved acceptance in the industry because it provides "an ideal unitized record, ease of duplication and ease of operation and implementation of the display" of information.

In Askanas' view, film and magnetic media (tape and disk, for example) "are very similar:' data in an emulsion on a polyester-based material. However, fiche is currently way beyond the state of the magnetic art in recording density."

Fiche, which can be produced in a variety of densities, provides two to 125 times the density of magnetic media, he pointed out.

Executive Corner

IBM Names Haddad To New Vice-Presidency

ARMONK, N.Y. — IBM has made several executive changes and formed a corporate technical personnel development staff.

Jerrier A. Haddad was named to the new post of IBM vice-president, technical personnel development, and will head a staff to promote engineering, programming, technology and scientific community leadership as well as enhance the exchange of technical information between IBM's labs and business units.

Bob O. Evans will succeed Haddad as vice-president of engineering, programming and technology.

Allen J. Krowe succeeds Evans as president of the System Communications Division and Victor J. Goldberg has been appointed IBM director of business plans.

Other Moves

- E. Russell Eggers, president of Loctite Corp., and Horace G. McDonell Jr., senior vice-president of the Perkin-Elmer Corp., have been elected directors of Perkin-Elmer.
- Jess Hay has been elected to the board of directors and Charles D. Ettinger has been appointed vice-president of administration at Carterfone Communications Corp.
- Thurman F. Breen has been elected chairman of the board of Eastern States Bankcard Association.
- Donald B. Bruck has been elected chairman of the board of Hybrid Systems Corp.
- Wilfred J. Corrigan was elected chairman of the board of Fairchild Camera and Instrument Corp.
- Atlantic Research Corp., having recently become an independent company, has elected the following directors to its board: William H. Borten, Dr. Lawrence A. Goldmuntz, W. Gerald Hamm, Charles B. Henderson, Dr. Howard J. Laster, Dr. Coleman Raphael and Joseph S. Steinberg.
- Shareholders of Communication Satellite Corp. have elected two new directors, Howard J. Morgens and Charles J. Pilliod.
- L. Neil Williams Jr. has been elected to the board of directors of National Data Corp.
- Edward Bleckner Jr. has been appointed president of Milgo Electronic Corp.
- L.C. Whitney has been appointed president and chief operating officer of National Data Corp.; George W. Thorpe, chairman and chief executive officer; and John B. Elliott, chairman of the executive committee.

TOOLSMITH
"GET ACQUAINTED" SPECIAL FEATURING
IBM-COMPATIBLE DATA STORAGE MODULES
3330-TYPE DISK CARTRIDGES
Why Lease When You Can Buy Top-Quality BASF Products
At 10% Off of Our Regular Low Prices??

		REGULAR	NOW ONLY
MOD 35-Compatible		$1385.00	$1246.50
MOD 70-Compatible		$1385.00	$1246.50
MOD 70F-Compatible		$3330.00	$2997.00

Plus Lifetime Manufacturer's Replacement Warranty

		REGULAR	NOW ONLY
3336-Compatible	1 - 3	$245.00	$220.00
	4-Plus	$230.00	$207.00
3336 Mod 11-Compatible	1 - 3	$550.00	$495.00
	4-Plus	$525.00	$472.50

Plus 5-Year Manufacturer's Replacement Warranty
Offer good only until July 31, 1977; only on your first order
Please specify byte capacity and drive type. Send check with order and we pay the shipping. Illinois firms add 5% sales tax.
THE TOOLSMITH ORGANIZATION, LTD.
P.O. Box 95094, Woodfield Mall Schaumburg, IL 60195
(312) 884-1381

REMOTE BATCH PROCESSING
ON IBM'S FASTEST CPU
360/195

TIME FOR SALE

GUARANTEED TURNAROUND
only
50¢ a second

OS/MVT, HASP/RJE, 2 Meg, 3330's and 2314's — United Airlines operates a **Cost Efficient** service featuring **High Speed Processing** and **Quick Turnaround**. Through **Auto Answer WATS** or leased lines (at speeds of 2000 to 9600 BAUD) you gain access to one of the most complete data centers in the United States.

Dial our number and execute your own programs or utilize a wide range of software — ICES, MARKIV, OSIRIS, BMD, PANVALET, GPSS, HEC1, HEC2, SWMM, all standard compilers and more.

If you are using an outside computer service, United can offer you a substantial savings and an unbeatable service.

COMPARE — call or write today to request a benchmark or additional information.

UNITED AIRLINES
Computer and Communications Services Division
Denver Technological Center
5350 South Valentia Way
Englewood, Colorado 80110
Call Collect (303) 779-2000 — Ask for Jon Burley

Charges Contract Breach

Distributor Sues Cincom for $4.4 Million

By Molly Upton
Of the CW Staff

PHILADELPHIA — A $4.4 million suit charging breach of contract, unfair trade practices and slander has been filed here against Cincom Systems, Inc. by its former Brazilian distributor, Deltacom Sistemas de Informacao S/C Ltda.

The suit, filed in the District Court for the Eastern District of Pennsylvania, demands damages for loss of profits resulting from what it calls the improper termination of contract and for compensatory and punitive damages resulting from the alleged defamation of Deltacom's integrity in South America.

Deltacom seeks interests and costs in addition to the $4.4 million. Cincom declined to comment on the case.

The suit arose after Cincom cancelled its representation agreement with Deltacom in January 1976. The U.S. software vendor charged the Brazilian firm with failing to remit royalties on Cincom software sold in Brazil since May 1973, when the contract was signed.

Wanted U.S. Dollars

Robert Malis, an attorney with the Philadelphia law firm of Malis, Tolson and Malis, said Cincom had wanted payment in U.S. dollars. However, the necessary approval by the Brazilian government was denied. Cincom then terminated the contract between the two firms [CW, June 28] after Deltacom had sold about $500,000 worth of software.

Cincom's installations in Brazil switched their maintenance contracts to the new Cincom representative, Sistemas Computacao e Informatica, and Cincom allegedly slandered Deltacom's reputation through letters and ads.

There had been other skirmishes between the two firms before Deltacom filed suit in Philadelphia.

Deltacom filed suit in the U.S. because it could not sue Cincom in Brazil since Cincom had no corporate entity established there, Malis said.

Cincom then tried to have the suit transferred to Brazil, but that petition was denied, he added.

International News

U.S. Sponsoring Ofisistemas '77

CARACAS, Venezuela — The Department of Commerce is sponsoring a major exhibition of U.S. advanced business equipment, computers and peripherals at the Edificio Thomas Alva Edison Exhibit Hall here, Dec.5-10.

The exhibit, Ofisistemas '77, is designed to take advantage of the trade opportunities Commerce has identified in Venezuela — a market expected to reach $140 million annually by 1979 at a growth rate of 28% per year.

Among the products Commerce has identified as having the highest sales potential are minicomputers, intelligent terminals, data entry systems, CRTs, microfilm and microfiche equipment, optical printers and readers, disk drives and packs, modems, software packages and word processing equipment.

Minicomputer sales, for instance, are expected to climb from $11 million in 1976 to $27 million in 1979, with U.S. suppliers retaining a 60% share of the market.

The U.S. is also expected to claim 60% of the data communications and remote terminal systems market in Venezuela, a market projected at $10 million for 1979.

Participation in Ofisistemas '77 is limited to 45 U.S. companies.

Further information is available from Hans J. Amrhein, Room 4036, U.S. Department of Commerce, Domestic and International Business Administration, Washington, D.C. 20230.

DP Nurtures Tokyo's Traffic System

By Ivan Berenyi
Special to Computerworld

TOKYO — Rapid development of Tokyo's computerized traffic control system has led to its overtaking similar systems in New York and Toronto as the world's most advanced traffic system, according to Osamu Nakamura, chief of the Traffic Control Division of Tokyo's Metropolitan Police.

More than 2,900 traffic lights across 32 wards of the city center — an area of about 168 square km — are now under complete computer control, Nakamura said. The number has almost doubled in the last 12 months.

Computer analysis of traffic flow enables early action to be taken to defuse potential jams by reordering the sequence and duration of traffic light changes.

The traffic flow data is gathered on-line from more than 3,200 ultrasonic vehicle detectors installed at roadsides throughout the city center.

More detailed information at peak-flow pressure points like the famous Ginza or Akasaka Mitsuke intersections comes from 19 closed-loop television cameras, phone calls from men on the beat, radio-equipped patrol cars and rush-hour helicopter surveys.

All the incoming data is analysed by a Nippon Electric Neac 2200 Model 375 computer with 524K-byte core capacity. An illuminated map of the city center shows in color codes the changing status of the city's traffic - white for good flow, orange for slowdown, red for full-scale jam. Visual display units give more detailed information, like the precise flow of traffic at any one intersection.

Control of the traffic lights is handled by six 64K Neac 3200 process control minis, communicating with the central processor through two 32K Neac 3100 front-ends.

"The system is being expanded every year in terms of the area covered, the number of computers intstalled, intersections controlled, vehicle sensors used and TV cameras mounted," says Nakamura.

The system is a merger of two former traffic services — the 10-year old Traffic Information Center, which used to gather data manually from policemen pushing buttons in police boxes to represent traffic flow, and the Computerized Signal System, set up in 1969, when the first Nippon Electric computer was installed.

The Traffic Information Center data was previously processed by two Technomaster control processors made by Matsushita Control Industrial Co. These have now been discarded.

The Matsushita 'Macc-7' computer complex, earlier dedicated to coordinate traffic lights along certain routes as a slave to the Computerized Signal System, was also phased out.

CDC, Yugoslav Firm Form Joint Program

MINNEAPOLIS — Control Data Corp. and Iskra ZP, of Ljubljana, Yugoslavia, have announced an agreement in principle covering a 10-year program of business and technical cooperation in the fields of computer-related technology and marketing.

The initial agreement sets forth a number of areas in which individual programs of cooperation will be pursued, including the design, development, production and marketing of minicomputer systems and the purchase of computer peripheral equipment.

Other areas of potential cooperation encompass the development and marketing of computer software appications programs, DP services and technology exchange in cooperation with CDC's Worldtech and Technotec services.

Foreign Orders & Installations

Imperial Oil Ltd. of Canada has ordered a Systems Technology Services Ltd. "minifuel" system to provide automated delivery, scheduling and accounting for customers of Imperial's Halifax home comfort centers.

Czechoslovakia's Ministry of Finance has ordered a Cognitronics Corp. System/70 optical character recognition system to be used for document processing at Kancelarske Stroje in Prague.

Atlasair, a UK-based international freight forwarding firm, has ordered an Altergo Computers Ltd. minicomputer system to be installed at Atlasair's main office at Feltham, next to Heathrow Airport.

Kienzle Apparate, GmbH, German producer of high-precision electronic instruments, has ordered 394 Beehive International terminals to be used in the European banking industry.

The Tokyo Sogo Bank has ordered a $10-million Burroughs Corp. B7700 system.

The Stichting Academisch Rekencentrum Amsterdam, a Dutch cooperative educational computing center, is installing a second Control Data Corp. system, a Cyber 173-8, to handle interactive time-sharing jobs.

Wardair, a Canadian charter airline, has ordered a Univac 1100/22 system valued at approximately $4 million.

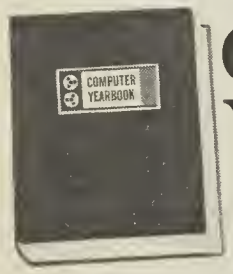
British Airways has ordered a C8500 data communications system from the Collins Commercial Telecommunications Division of Rockwell International. Scheduled for installation at Heathrow Airport in the spring of 1978, the system will provide both high-speed data and low-speed telegraph message switching plus control functions.

Industridata AB, Sweden's second-largest service bureau, has ordered three Burroughs Corp. B6800 systems and three B876 systems and communications processors for use in its distributed DP network.

Compugraphics, European semiconductor maskmaking firm, plans to install an Electromask, Inc. Series 2500 combination pattern generator/image repeater at its Edinburgh, Scotland, plant in late summer.

W.Schlafhorst & Co., West German textile machinery manufacturer, has placed the first West German order for the Univac 90/80 system. The system will take over master planning, work order management, credit handling, purchasing and a personnel information system.

LARGE CAPACITY DATA ENTRY SERVICE
• Three locations/150 operators
• 2 key-disc systems/75 keypunch machines
• 80 OCR typewriters/1 OCR scanner
• Guaranteed quality and turnaround
• No job too large or too small
NATIONAL BUSINESS SYSTEMS, INC.
4555 West 77th Street
Minneapolis, MN 55435
(612) 835-5226

IMPORTANT FOR COMPUTER USERS

Computer Yearbook
STATE OF THE ART • SYSTEMS • SOFTWARE • OATA COMMUNICATIONS • PROJECTIONS
Annual Subscription $35.00
IEIS • P.O. BOX 2658B, DETROIT, MI 48231

Plug In High Performance
$950.00
single quantity

Techtran 815 DATACASSETTE
Now For The First Time Anywhere... A super low cost, plug compatible, DIGITAL CASSETTE RECORDER!
Featuring:
• 145,000 character storage
• Terminal & Modem/CPU Interfaces
• Automatic send/receive
Call or Write Today!
Techtran Industries, Inc.
200 Commerce Drive
Rochester, N.Y. 14623
Phone (716) 334-9640
TWX 510-253-3246
TECHTRAN

Detach here, moisten and seal envelope securely before mailing.

Fold and insert order form (attached through binding) and remittance here.

USE THE ATTACHED ORDER FORM AND THIS ENVELOPE FOR:

- ☐ *a new subscription*
- ☐ *new address*
- ☐ *new title*
- ☐ *new industry*

Order form is attached through binding. Be sure to include current label or label information when making a change.

first class
permit no 40760
newton ma

BUSINESS REPLY MAIL *no postage stamp necessary if mailed in the United States*

postage will be paid by

COMPUTERWORLD

797 Washington Street
Newton MA 02160

CIRCULATION DEPARTMENT

position announcements | position announcements | position announcements | position announcements | position announcements

POSITION ANNOUNCE-MENTS

EDP

Opportunities in the beautiful Pacific Northwest and Rocky Mountain region. Programmers, programmer analysts, systems analysts, scientific programmers. Call collect or mail resume with salary and geographical preference to **LARRY LEBLANC, CAREER SPECIALISTS,** 1703 Main St., Vancouver, WA 98660, (206) 695-1571 or (503) 248-9753 and/or **KEN MURNEY, CAREER SPECIALISTS,** 1200-112 NE, Suite 101, Bellevue, WA 98004, (206) 455-0582.

FIELD SERVICE

SYSTEMS	370/360, H-200, XDS, Univac, CDC All Large & Medium CPU's
MINI's	PDP, NOVA, G.A., HP, etc. All Mini Systems
I/O	STC, TELEX, CDC, ITEL, CALCOMP, etc. All Peripheral Experience

MTTR
(312) 547-6682
MTTR ASSOCIATES
1107 Mannheim Road
Westchester, Ill. 60153
$12-24K

Field Service Specialist
Nationwide Placement
Private Employment Agency
No Fees To Applicants

MANAGER manufacturing market planning

East coast computer manufacturer is actively seeking an individual to manage a group of professionals in a planning function, chartered to define computer hardware and application software requirements to meet the future needs of its customers in the manufacturing community, worldwide.

This individual should possess the following background:

- Practical manufacturing experience, e.g.
  - Production control manager
  - Material manager
- Manufacturing application software, e.g.
  - PICS/IPICS
  - BOMP/DBOMP
  - UNIS
- CAD/CAM exposure, e.g.
  - APT
  - Engineering graphics
- Specification development, e.g.
  - Manual systems
  - Hardware systems
  - Application software systems
- Managerial experience, e.g.
  - Projects
  - Budgets
- Data base orientation
- Marketing exposure

Qualified individuals are invited to submit resume of education, experience and salary requirements, in the strictest confidence to:

CW BOX 5057
797 Washington Street
Newton, Mass. 02160
An Equal Opportunity Employer M/F

Senior Operating Systems Analyst

Owens Illinois, a multi national packaging corporation, seeks an experienced Senior Operating Systems Analyst to work in our highly sophisticated IBM OS environment. This highly motivated professional will act as a consultant in technically advanced projects throughout the company's programming and systems areas. In doing so, you will be responsible for researching and developing studies, pilot projects and corporate standards in areas of computer technology new to our company such as data base, COM and word processing.

This high demand position requires a minimum of 3 years successful data base and related programming experience and extensive knowledge of COBOL and TOTAL. A background in COM, word processing, on-line systems and interactive programming preferred.

We offer excellent salary and complete fringe benefit package. To arrange a confidential interview, send a resume with salary history to:

Personnel Selection & Recruitment

OWENS ILLINOIS, INC.
P.O. Box 1035
Toledo, Ohio 43666

OWENS-ILLINOIS

An Equal Opportunity Employer M/F

MINI-COMPUTER SR. SYSTEMS PROGRAMMER/ANALYST

WHERE

- GTE Data Services needs mini-computer application specialists. Our Florida headquarters needs top flight multi-vendor persons to interface with management and users in the telephone industry.

THE JOB

- Participate in and lead innovative programmers to deliver Technical Services to our telephone customers.
- Work with our six major Data Centers in developing solutions to today's tasks insuring interface with future network plans.

WE REQUIRE

- Solid record and degree or comparable experience.
- 2-5 years mini-computer and networking experience.
- Multiple vendor experience (HP, DEC, etc.). Software will interface with large scale IBM Systems.

WE ALSO NEED

- CICS/IMS Systems Programmers and
- Data CDM Systems Analysts with IBM and/or Honeywell experience

WE OFFER

- Competitive salary
- Growth Opportunity
- Outstanding fringe package
- Living on Florida's West Coast

Send your resume to (Mrs.) Tannia Yarbrough, EED Coordinator, GTE Data Services Incorporated, First Financial Tower, P.O. Box 1548, Tampa, Florida 33601

"AN EQUAL OPPORTUNITY EMPLOYER M/F"

GTE DATA SERVICES INCORPORATED

Join GTE Sylvania's COMMITMENT TO EXCELLENCE...

as we continue to excel in REAL-TIME SOFTWARE DEVELOPMENT on the San Francisco Peninsula

Remember when your talents and ideas were appreciated? Remember the pride of achievement you felt after overcoming a complicated and challenging assignment? That environment still exists, with GTE Sylvania on the beautiful San Francisco Peninsula. Opportunities are available for PROJECT LEADERS as well as for individuals with experience on PDP 11/45 and PDP 11/70 with RSX and IAS operating systems, plus background in one of the following areas —

- **Experience in the development of hierarchical, network, and relational technical data base management systems. These data base systems operate as part of real time collection, analysis, and reporting systems as well as non-real time analysis systems. 3-10 years' experience required.**
- **5 plus years' experience in high level software system specifications and design with an understanding of system interface. Requires ability to coordinate and review multiorganization software efforts.**
- **5 plus years' experience in bidding, organizing, scheduling, tracking, and controlling software development efforts in a matrix organizational environment. Requires ability to parse work to functional organizations, prepare work authorizations, and control performance against those work authorizations.**

Ready to join a company committed to excellence? Then investigate these openings now and expect a good salary, great benefits package, warm year 'round weather, and opportunities for travel and field assignments. For immediate consideration, please forward your resume with salary history and requirements to Professional Employment, Dept. CW-154, P.O. Box 188, Mountain View, California 94042. An equal opportunity employer. Minorities and females encouraged to apply. U.S. citizenship is required.

GTE SYLVANIA

GROUP INFORMATION SYSTEMS MANAGER

The world's largest independent producer of tape transports, and a manufacturer of various computer peripheral products for the OEM market has an immediate requirement for a seasoned Information Systems Manager. This position will be in the suburban West San Fernando Valley area of L.A.

The selected candidate will have total responsibility for developing, planning and implementation of all data processing and information systems at multiple site installations within the Microsystems and Peripherals Group; as well as responsibility to ensure economical use of EDP hardware and personnel. Heavy emphasis will be placed on analysis and evaluation of hardware and software requirements and the selection and installation of equipment configurations to support a distributed data processing environment.

If you have a strong business and technical orientation with 8 - 10 years direct EDP management experience, preferably in a manufacturing environment, you are invited to submit your resume in strict confidence to:

Gary Villella, Pertec Computer Corporation, 9610 DeSoto Avenue, Chatsworth, California 91311.

An Affirmative Action Employer M/F

PCC PERTEC
a division of Pertec Computer Corporation

Join the EDP

Advance your career with a leader

NCC INTERVIEWS

WORLD HEADQUARTERS – DAYTON, OHIO

COMPETITIVE PRODUCT ANALYST

Join our Corporate Market and Product Evaluation group and apply your expertise in this area.

To qualify, candidates will normally possess an applicable degree plus experience in operational software or application software as a Programmer or Systems Analyst. We prefer knowledge of DOS-VS-OS-Communications-MIS and data base; analytical, evaluative and interpretive skills; ability to reduce technical matter to decision-making form and communicate effectively; and the capability to practice EDP skills individually, as a team member, or project leader.

You will play an important role with a highly motivated professional group.

SYSTEMS ANALYSTS CORPORATE MIS

Our Corporate Management Information Systems organization is looking for people with 7 or more years business systems development and installation experience who wish to participate in major, multi-national information systems projects.

BS Business Administration, Accounting or Marketing preferred or equivalent work experience.

SOFTWARE QUALITY ANALYST

Our International Division has immediate openings for Software Quality Analysts who will be responsible for design and implementation of test activities on new software applications. We prefer an individual with a college degree in Business Administration / Engineering / Computer Science plus 4-6 years experience in EDP, especially applications programming. These positions require knowledge of COBOL and Assembler type languages.

PROGRAMMERS

Our International Financial Systems group is looking for Programmers with 2-4 years experience to develop international banking systems.

These positions offer challenge, broadening of career, work in the forefront of technology and the opportunity to progress rapidly into a position of project management.

To qualify you will currently be working in a banking or communications environment. We prefer experience with COBOL, systems analysis and design. Some positions require a knowledge of ledger or minicomputer applications systems.

NCC INTERVIEWS

To arrange for an interview at the NCC Show, Call Vernon Mirre at 513/449-2281 June 6 through June 10, 1-5 p.m. (EDST)

If you are unable to call, forward your resume along with salary requirements to:

Mr. Vernon L. Mirre
Corporate Executive & Professional Recruitment
NCR Corporation
Dayton, Ohio 45479

If you are a Systems Analyst, Programmer Analyst, or an EDP professional, we'd like to hear from you. Send your resume indicating geographic preference to Mrs. Marjorie L. Jones, Director, Corporate Executive & Professional Recruitment, NCR Corporation, Dayton, Ohio 45479.

DATA PROCESSING DIVISION – SAN DIEGO

San Diego, Calif.

PROGRAMMER/ ANALYSTS

NCR Data Processing Division has immediate openings for Programmer Analysts in:

- **MIS Applications**
- **Software Development**
- **Firmware**
- **Diagnostic Programming**
- **O/S Project Lead**

  (Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing)

- **Software Configuration Management**
  (Design, develop programs to support software testing, release and repair)

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange for an NCC INTERVIEW Call George Rice 214/748-8080

on Sunday, June 12 through Wednesday, June 15 or send resume immediately including salary history, training and experience to:

Mr. George Rice
Data Processing Division
NCR Corporation
16575 W. Bernardo Drive
San Diego, Calif. 92127

TERMINAL SYSTEMS DIVISION – CAMBRIDGE

Cambridge, Ohio

SR. SOFTWARE ENGINEERS

They will provide direction in the planning section of our Retail Systems Software organization, being responsible for interpreting systems specifications and developing operating systems, language, and diagnostic requirements for future retail systems.

Should be familiar with evaluating system software performance in a real-time processing environment. A degree and from 3-7 years applicable experience will round out your qualifications.

PROGRAMMER/ANALYSTS

To design, implement, document, and maintain assembly coded driver, interface and application modules for mini and microprocessor based retail point-of-sale terminal systems. Experience in assembly coded programming in a multi-tasking real-time executive based system or Intel 8080 or equivalent. BS in Engineering or Computer Science.

NCR's P.O.S. group is located in rural east central Ohio, offering a fine living and working environment.

We invite your response as soon as practical.

Robert W. Donovan
Terminal Systems Division-Cambridge
NCR Corporation
Box 728
Cambridge, Ohio 43725
614/439-0291

Professionals

Think of NCR as over 65,000 people, all involved — one way or another — with the processing of information. We're active. We research, invent, develop, manufacture, market and service many kinds of information products and systems; and we do it in all the major cities in the United States plus 120 foreign countries.

TERMINAL SYSTEMS DIVISION-ITHACA
Ithaca, N.Y.

PROGRAMMERS SYSTEMS ANALYSTS ENGINEERS

We are a world leader in the manufacture of microcomputer systems and you will be immediately caught up in challenging work at the outer edge of the state-of-the-art. This includes exposure to microprocessor technology and the relatively rare opportunity to develop skills with a growing professional staff.

We are located near Cornell University in one of the loveliest cities in the beautiful Finger Lakes area where living is an exciting experience equally rich in educational and recreational opportunities. We will assist in relocation, if hired.

We are seeking applications from people with the following experience:

- **Digital Electronics Design: Microprocessors, LSI, TTL and machine language programming**
- **Communications: Networks and SDLC, bisynch, asynch disciplines**
- **Operating Systems Design and Implementation**
- **Applications: Data Entry/Data Inquiry Systems, Distributed Processing**

BS Computer Science or Electrical Engineering and 1-7 years experience required.

We offer an outstanding compensation and benefit package — let us hear from you. Send resume and salary requirements in confidence to:

Mr. M. A. Friedenberg
Professional Placement
Terminal Systems Division-Ithaca
NCR Corporation
950 Danby Road
Ithaca, N. Y. 14850

TERMINAL SYSTEMS DIVISION-MILLSBORO
Millsboro, Delaware

Grow with the Pioneer of POS Terminals!

NCR's Terminal Systems Division in Millsboro, Delaware has unparalleled career opportunities for individuals interested in advancing state-of-the-art in POS terminals.

SYSTEMS PROGRAMMER/ENGINEER

Experience with DEC PDP 11/35 or higher level computers required.

Requires a background in minicomputer or microprocessor systems and/or associated application programming.

SYSTEMS I/O-F/W PROGRAMMER

Requires experience in general purpose applications minicomputer programming of peripheral devices, at the assembler level.

Responsibilities will include the definition and supervision of coding of applications oriented F/W to interface POS terminal peripherals to the base ECR.

DIAGNOSTIC ENGINEER/PROGRAMMER

Requires an engineer or hardware-minded programmer with minicomputer programming experience and a flair for the challenge of diagnostic test software.

COMMUNICATIONS F/W PROGRAMMER

Requires experience in data communications minicomputer programming at the assembler level.

Experience with RJE-type communications and synchronous protocols preferred. Knowledge of SDLC fundamentals a plus.

MANUFACTURING SYSTEMS ANALYST

On-line inventory control, WIP, MRP and financial systems experience in a manufacturing environment.

Will design advanced EDP systems in the areas of material and production control as well as financial applications.

Programming knowledge required; prefer COBOL, Assembler, or NEAT/3 experience as well as data base (particularly TOTAL).

All positions require a BS in EE, CS, Math or related discipline.

In addition to an unparalleled career opportunity within NCR, our Millsboro location offers comfortable living in a scenic and uncongested coastal area. The finest marine recreational areas, wildlife preserves, and beaches are within minutes of our Millsboro facility.

If success interests you, please send your resume to:

Mr. Ron Tull, Dept. CW-66
Terminal Systems Division-Millsboro
NCR Corporation
P.O. Box 607
Millsboro, Delaware 19966

DATA PROCESSING DIVISION-WICHITA
Wichita, Kansas

Computer Professionals... You'll like NCR-Wichita.

We provide a state-of-the-art challenge in realtime architecture, develop network design and communication control for distributive processing in a revolutionary data processing minicomputer environment. Here you are given the chance to create and are treated as the unique individual you are.

Professional development is encouraged through a tuition-refund plan for academic work toward approved graduate and undergraduate degrees at accredited colleges and universities in the area.

You will enjoy some of America's finest living in addition to excellent working conditions. Some of our opportunities are:

Compiler Design Programmers
Serve as a team member for design development documentation testing and enhancing of large compilers.

Minicomputer Operating Systems
Responsible as a team member for design, implementation and testing of interactive general purpose operating systems to support COBOL applications and utilities, written and assembly language.

Diagnostic Design & Programmers
Design, modification and support of diagnostic programs to provide for testing on new mini/micro processor based hardware systems.

WE'RE WORTH AN EXTRA-SPECIAL LOOK . . .

Get in touch today By Phone: 316/687-6192
By Resume: Mr. Jerry Long, Professional Placement Office, Dept. AB, 3718 North Rock Road, Wichita, Kansas 67226.
You'll get complete details either way.

An Equal Opportunity Employer

SYSTEMEDIA DIVISION
Miamisburg, Ohio

PROGRAMMER/ANALYSTS

These positions offer an opportunity to pursue your development goals in the EDP field. A degree plus experience as a Programmer/Systems Analyst is required. Background in accounting applications and with an NCR Century 200 system would be helpful.

At our Systemedia Division location (south of Dayton, Ohio) you will find an atmosphere conducive to the development of your professional goals. This area is the home of about three-quarters of a million people who enjoy the best of a progressive midwestern city. Housing is moderately priced and not difficult to find. Schools are good, and institutions of higher learning provide many opportunities to add to your education. Send resume to:

G. W. Fridenmaker
Systemedia Division
NCR Corporation
9095 Washington Church Road
Miamisburg, Ohio 45342

NCR

Complete Computer Systems

position announcements | position announcements | position announcements | position announcements | position announcements

PROGRAMMER/ANALYSTS

Major advertising agency located in beautiful north Detroit suburb. DOS/VS on a 1 meg S/370-138, 3344's, COBOL, and some PL/1. Five mini's installed throughout the U.S. This is a ground floor opportunity for a sharp, aggressive individual in a small, eight person department.

Private offices, creative atmosphere, and a dynamic environment. Minimum 1 year experience.

Send resume to: Mr. Dennis Bartt
D'Arcy-MacManus & Masius
Woodward at Long Lake Road
Bloomfield Hills, MI 48013

SENIOR TECHNICAL REPRESENTATIVE

Leader in software and systems development. Expansion in the marketing support dept creates need for customer reps. Support, testing, programming implementation and operational procedures. 4+ yrs of Fortran IV. $24,000

ROBERT HALF PERSONNEL AGENCIES
522 Fifth Avenue
New York, N.Y. 10036
(212) 221-6500

EDP AUDITOR

California

Immediate opening for candidate with formal educational background in accounting or computer science and a minimum of 1 to 2 years bank auditing experience. Needed are excellent written and oral communicative skills

Please send your resume and salary history in confidence to. **Linda R. Masi, Employment Division 2-53, 611 No. Brand Blvd., Glendale, CA 91203.**

SECURITY PACIFIC BANK
There's Security in Numbers
Equal Opportunity Employer M/F

field engineering

A Very Good Year for Us. A Better One for You?

Most computer professionals are aware that today's most advanced large-system technology was developed by a company that, not too long ago, was virtually unknown.

Now the phenomenon is widely known. Amdahl's 470V/6 performs as promised. And the company performs as promised: our hardware and software support exceeds the established standards.

Not well known, however, is that this major supplier of large systems is still, in terms of staff size, relatively small. At Amdahl, you're not lost in a sea of people: we began 1976 with less than 400 people and ended it with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

FIELD ENGINEERING SPECIALISTS

You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your response.

FIELD ENGINEERS

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 567-3E on your response and direct it to the Amdahl regional office nearest you as shown below.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, California 94086

Amdahl Corporation
680 Fifth Avenue
New York, New York 10019

Amdahl Corporation
2021 Spring Road
Oak Brook, Illinois 60521

Amdahl Corporation
22150 Greenfield Road
Oak Park, Michigan 48237

Amdahl Corporation
5454 Wisconsin Avenue, Suite 1535
Chevy Chase, Maryland 20015

amdahl

21 SHOESTRING START-AT-HOME COMPUTER BUSINESSES

113 page research report uncovers areas never published, plus hundreds of how-to-do-it ideas on moonlighting, starting up, image building, bidding, contracts, failure signals, and much more. A superior career planning tool $12.00 (check, Mastercharge, Bankamericard) Guaranteed Refundable,, to DATASEARCH INC., Suite 108, 730 Waukegan Rd., Dept. G, Deerfield, IL 60015.

COMPUTER SCIENCE FACULTY

Visiting: teaching position in undergraduate computer science and information systems curriculum (Sperry, Systems analysis, O.R., numerical analysis, non-numeric processing, computer architecture). Doctorate preferred, Master's considered. Rank and salary dependent upon qualifications. To begin fall semester (Potsdam is located in St. Lawrence Valley, north of the Adirondack Mountains). Apply with credentials to:
Dr. J.F. Dalphin, S.U.N.Y.
Box 620
Potsdam, N.Y. 13676

An Equal Opp/Affirmative Action Employer

Chevron

SYSTEMS PROGRAMMER ANALYST

Career opportunity with a major oil company in Houston for an individual with the following qualifications:

- Several years of assembly language coding experience
- Some large scale IBM SCP experience including systems generation, PTF application, etc.
- Additional experience in MVS, JES2, TSO Teleprocessing, interactive graphics desirable
- BS Degree in technical field preferred

For immediate consideration, send resume, salary requirements and college transcripts to:

PERSONNEL MANAGER
P.O. Box 36487
Houston, Texas 77036
An Equal Opportunity Employer
Dedicated to Affirmative Action

H-6000 SYSTEMS AND SOFTWARE PEOPLE

Exciting opportunity to join Control Data's OEM Mass Data Systems Software Development Group. This product is a major new development in computer industry.

GCOS SYSTEMS PROGRAMMER

We are looking for a GCOS Systems Programmer with wide experience in data processing. The ideal candidate will be able to write and implement SSA modules utilizing GMAP, interpret master mode core dumps and be familiar with COBOL and the file system.

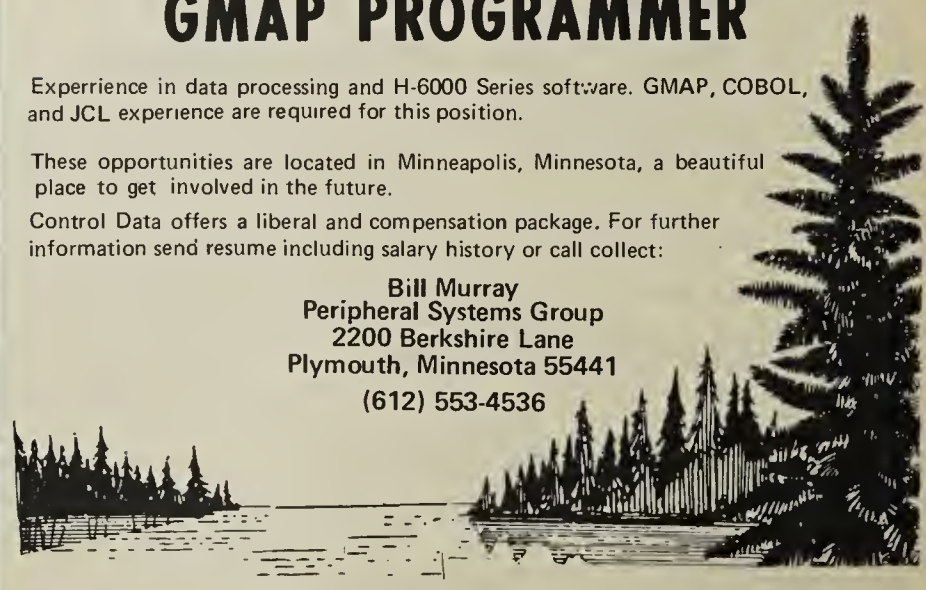
H-6000 SERIES GMAP PROGRAMMER

Experrience in data processing and H-6000 Series software. GMAP, COBOL, and JCL experience are required for this position.

These opportunities are located in Minneapolis, Minnesota, a beautiful place to get involved in the future.

Control Data offers a liberal and compensation package. For further information send resume including salary history or call collect:

Bill Murray
Peripheral Systems Group
2200 Berkshire Lane
Plymouth, Minnesota 55441
(612) 553-4536



CONTROL DATA CORPORATION

An Affirmative Action Employer M/F

position announcements | position announcements | position announcements | position announcements | position announcements

Financial Service Marketing Representative

CBT Data Services, a wholly owned subsidiary of CBT is seeking an experienced salesperson to market EDP financial services.

The individual we seek will be responsible for expanding and developing commercial EDP services in Connecticut. These services include payroll, accounts payable and receivable, inventory control, and general ledger. 2-5 years experience in data processing sales or a directly related field is required.

Please submit resume, which includes salary history and expectations to Steven Bell, Manager, Professional Recruitment.

The Connecticut Bank and Trust Company

1 Constitution Plaza, Hartford, Connecticut 06115
an equal opportunity employer m/f

---

make milgo your future

TECHNICAL WRITERS

SOUTH FLORIDA

Milgo Electronic Corporation has opportunities available for technical writers with 1-5 years experience The ability to read and interpret digital and electronic logic/schematic diagrams and a good understanding of microprocessor systems are required. Responsibilities will include writing technical (electronic) and software (user and application programmer) manuals.

The successful candidates will be aggressive self-starters looking for fast professional growth in the technical communications field. Associate degree or Bachelors degree in engineering or journalism is a plus, but demonstrated ability to describe complex electronics circuits and/or software programs clearly and concisely will win the job.

Milgo offers excellent salaries, complete company benefits, and a relocation allowance as well as the benefits of South Florida living. To arrange for your interview, send your resume in complete confidence or call Dan Haynes at (305) 592-8000 collect.

Milgo Electronic Corporation
8600 N.W. 41st Street Miami, Fla. 33166

Equal Opportunity Employer

WELCOME BOSTON CARAVAN '77! IMMEDIATE INTERVIEWS

VISIT HOLIDAY INN, HOSPITALITY SUITE, Route 128
EXIT #38 Washington Street, Suite 106-108
June 6, 7, 8, 9 - Time 9 am.-9 p.m.

WE ARE BEING RETAINED TO RECRUIT FOR THE FOLLOWING POSITIONS:

Graphics Systems Development

The Company: Graphics Product Division of a $200 million company.

The Position: Individuals hired will be involved in a variety of software systems centered around mini and micro processors. Within the next year, systems will be designed and programmed for specific need and serve real-time, multi-user, multi-task interactive software projects. Assembly/Micro coding experience required.

Compensation: Low Twenties

Programmer/Analysts

The Company: $900 million Retail/Distribution Company

The Position: Dual S/370's with CICS supported by COBOL/BAL. Highly motivated individuals needed to develop and support accounting, warehousing and merchandising applications. The ability to define and design user problems is vitally important. Excellent visability exists for management responsibility.

Compensation: 15K - 20K

Senior Assembly Language Analysts

The Company: A major control oriented manufacturer.

The Positions: Two senior level contributors and one project leader are needed to contribute to the growth of this mini/micro based company. They have been a pioneer in utilizing relay ladder logic in their systems. Minimum of two years assembler programming required. Micro technology software preferred, but not required.

Compensation: 17K - 28K. Excellent fringes including dental

Applications Analyst Programmer

The Company: Management consulting firm with offices located in most major Eastern United States cities.

The Positions: Require aggressive articulate people who are suited for project management/user interface. Areas of involvement include: Structured Design/Programming, Database (IMS, IDS, TOTAL) and Vendor Supplied Communications Software (CICS). Background should include 2-5 years COBOL S/360/370, Sys/3 or DEC minis. The ability to work independently is important.

Compensation: Mid-Upper Teens. Excellent Visability.

Manager Data Processing

The Company: Capital equipment manufacturing company, $15-20 million volume.

The Position: S/370 environment. Currently under utilized, looking to go database/Distributed processing to all user departments. Immediate need in MRP. Demonstrated systems development in manufacturing/financial as well as demonstrated management experience required. Excellent verbal and written skills essential along with a B.S., MBA strongly preferred.

Compensation: $25,000 Salary plus excellent fringes, tuition, relocation.

R&D Computer Scientist

The Company: R&D Division of a major high technology conglomerate.

The Position: Will perform applied research in the area of distributed database systems. Will investigate strategies for supporting data access transparency and multiple copy synchronization. Will explore methods for distributing control functions, develop performance and cost models and consult to operating divisions. Experience should include database systems. operating systems and programming languages. Education BS/MS or Ph.D. Computer Science ideal.

Compensation: Mid-High Twenties

VISIT MAS BURLINGTON OFFICE OR CALL 273-1740
Directions: 128 Exit #42N to Burlington Mall-3rd set of lights take right-Lexington Street Mall Road, 1/4 mile on right, Entrance to New England Executive Park, Bldg. #15 June 6, 7, 8, 9 - Time 9 a.m.-9 p.m.

If you are unable to attend,
Please call or submit your resume
ADDITIONAL OPPORTUNITIES EXIST LOCALLY/NATIONALLY
FROM $15-35K

*Network Software
*IBM Internals
*T/S Development
*Medical Instrumentation
*EFTS Network Applications
*Point-of-Sale Software
*Credit Authorization Applications
*Firmware Development
*Diagnostic Networks
*Compiler Development
*Quality Assurance Software
*Emulation Software

MAS Management Advisory Services, Inc.
15 New England Executive Park, Burlington, Mass. 01803
(617) 273-1740

All fees/relocation assumed by our client companies. Our clients are equal opportunity employers.

NO ALTERNATIVES?

ONLY

We can help you out of a professional dead end. We're the NPA affiliates with success in our DP backgrounds. Our fees are employer paid.

Benefit from our experience. We'll put you on a one-way street to fulfillment.

National Personnel Associates®

CAPITAL PERSONNEL SERVICE
204 Securities Building
418 Seventh Street
Des Moines, Iowa 50309
(515) 283-2545

AVAILABILITY, INC.
Data Services Consultants
1300 N. Westshore Blvd.
Tampa, Florida 33607
(813) 872-2631

BRENTWOOD PERSONNEL ASSOCIATES
1280 Route 46
Parsippany, New Jersey 07054
(201) 335-8700

COMPUTER CAREERS INC.
Specialists - Data Processing
4720 Montgomery Ln. # 503
Bethesda, Maryland 20014
(301) 654-9225

ELLS PARK PERSONNEL SERVICES
5050 Excelsior Boulevard
Minneapolis, Minnesota 55416
(612) 927-4653

CAREER SPECIALISTS PERSONNEL SERVICES
4600 El Camino Real, Suite 206
Los Altos, California 94022
(415) 941-3200

WETERRINGS & AGNEW, INC.
425 Midtown Tower
Rochester, New York 14604
(716) 454-3888

MANAGER SYSTEMS AND PROGRAMMING

We have a growth situation for an experienced project manager with an interest in management. This position requires proven ability normally gained through four years experience in systems design, programming project organization and problem solving. Additional knowledge of IBM hardware and software is also necessary (ideally in a medical environment). Send complete resume including salary history.

Personnel Department
MEDICAL COLLEGE OF WISCONSIN
561 N. 15th St.
Milwaukee, WI 53233

Systems Programmers

As one of the midwest's leading multi-divisional management consulting and systems integration organizations, our steady growth requires top professionals in the following areas:

* IBM 370: Systems Software, CICS, COBOL, PL/1
*BURROUGHS: B4700 and B6700
*HONEYWELL: COBOL, Fortran
*Real-Time Programmers: Experienced in minicomputers.

Top salarries, fully-paid fringes including life, health and dental insurances, moving allowance and educational benefits. Call or send your resume to:

M.I.S. INTERNATIONAL, INC.
31350 Smith Road
Romulus, Michigan 48174
(313) 326-7010
An Equal Opportunity Employer M/F

position announcements | position announcements | position announcements | position announcements | position announcements

DATA BASE ADMINISTRATORS SYSTEMS PROGRAMMERS

Major New Jersey university currently involved in the development and implementation of large scale administrative systems under IMS has the following positions available:

DATA BASE ADMINISTRATORS (2)

Requires Bachelor's Degree or equivalent and 3 years programming and systems experience with large scale systems, OS JCL, COBOL, assembler and a minimum of 1 year of experience as a Data Base Administrator in an IMS DB/DC environment and recent IMS training.

SYSTEMS PROGRAMMERS (2)

Requires Bachelor's Degree or equivalent and 3-4 years experience as an applications or systems programmer with a minimum of 2 years systems programming experience. Strong knowledge of OS MVT, SVS, MVS, assembler and IMS internals. COBOL and conversion experience helpful.

Liberal fringe benefits

Qualified applicants forward complete resume, in confidence indicating position and salary requirements to:

CW Box 5062
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity
Affirmative Action Employer M/F

Academic Systems Manager

Loyola University, New Orleans, seeks an **Academic Systems Manager. Job functions are:** Manage academic computing activity in an interactive computational environment; educate and encourage faculty in computer usage; perform all systems programming functions for academic activities; generate, optimize, maintain, and, if necessary, modify academic operating systems; acquire and adapt desirable application software; produce and maintain complete on line documentation for all application software systems; teach one three credit-hour course each semester in an area demanding computer usage. **Prerequisites:** Master's degree or equivalent; three to five years experience in activities in which computing was the major component; experience in a broad base of computer application areas (e.g., scientific computing, statistics, data processing, systems software, CAI, etc.). Starting date open. Salary negotiable based on credentials and experience. Applications should be sent to Dr. John Meredith, Chairman, Search Committee, College of Business Administration, Loyola University, New Orleans, La. 70118. Loyola University is an Equal Opportunity and Affirmative Action Employer.

SENIOR SYSTEMS PROGRAMMER

OLIN Has the Environment You Want, to perform at your best and to grow professionally.

OLIN, a large and successful technical company, has scored an impressive growth record. Our Chemicals Group, largest within Olin, has sales exceeding half-a-billion, and steadily climbing. And Olin, as you might expect has always emphasized Systems and advanced computer-based management approaches. Finally, add our convenient location and beautiful facilities. It all adds up to an opportunity for solid, rewarding career progress.

At least 5 years' experience is needed in systems programming, with knowledge of BAL, JCL, OS/VS utilities and OS/VS internals essential. Teleprocessing background and VSAM experience will each be a plus. A broad systems programming foundation is needed, including ability to analyze dumps and to assist COBOL programmers. You'll be working with 170/158 MVS, 3 megabytes.

Our salaries, fully competitive, will reflect your experience and capabilities. Please send resume, with salary data, in confidence, to: Mr. John Dunn, Placement Officer, CW.

Olin Corporation/Chemicals Group
120 Long Ridge Road, Stamford, Connecticut 06904
An Equal Opportunity Employer M/F

Olin

EDP SPECIALISTS

Nationwide

- **CORP DIR MIS** — To $40M
  NYC location
- **INTERNAL CONSULTING** — To $45M
  Chicago location, major co
- **MGR METHD & PROCED** — To $30M
  Texas location
- **SYS ANAL MRP** — To $23M
  Upstate NY location

Fees assumed by client co's

LESLIE, KAVANAGH
505 5th Av, NY, NY 10017
(212) 661-0670 (agency)
Corporate Inquiries Welcome

"YOUR TICKET TO FLORIDA"

IN FLORIDA, THERE'S...

HARRIS COMPOSITION SYSTEMS DIVISION

One of the leaders in the development of newspaper composition and electronic typesetting systems, offering you an excellent career opportunity . . . and a wonderful career climate in Melbourne, Florida.

SYSTEMS ENGINEER

We have an immediate career opportunity for the individual with EE degree or computer science background and 8 to 10 years experience in handling in-depth analysis of multiuser, real-time interactive digital systems. This position also requires your ability to evaluate hardware/software trade offs and a strong background in digital systems design with emphasis on multiple terminals and multiple processors communicative via software operation systems to large data bases.

We offer you an excellent income commensurate with your experience, a comprehensive benefits program and both professional and personal growth potential in a comfortable year-round location.

We will be scheduling interviews to be held in Dallas, Texas during the National Computer Conference, June 13-16. Call now (collect) for interview appointment or send resume to Mr. J.E. Jensen, Harris Composition, Systems Division, P.O. Box 2080, Melbourne, Florida 32901. (305) 259-2900.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

An Equal Opportunity Employer Male and Female

The ROMAC DIFFERENCE

A Local Call Goes A Long Distance

Call or visit the Romac office nearest you, and make contact with our expert personnel consultants. Experienced executives constantly in-touch with key executives and top management in EDP, Accounting and Banking.

Your local call gives you access to Romac offices in 12 major eastern cities. You're not restricted to searching your immediate area. You have access to the best openings, in your industry as well as the best professionals available. All that for just a local call. That's the Romac Difference.

ROMAC
& ASSOCIATES/
Personnel Consultants

Contact Romac & Associates, A L Lemay President, 2 Sun Life Executive Park, Wellesley Hills, MA 02181 for transmission to our Partners in Atlanta, Boston, Buffalo, Charlotte, Hartford New Haven, New York, Portland, Rhode Island Rochester/Syracuse, Stamford

EDP SPECIALISTS

HEAVY CONSTRUCTION

Ebasco, a world leader in the design and construction of nuclear, fossil and hydro-electric power plants needs the kind of top caliber individual that can fully implement a complete range of construction automated processing systems.

We are presently engaged in upgrading, maintaining and implementing our COBOL Based Construction Control System which includes Accounting, Cost, Planning and Scheduling, Material Control, QC/QA, Document Control, etc. in an IBM 370, Burroughs 1700 and 7700 and Univac 1100 environment at the home office and at various construction sites. All qualified applicants must have good communication skills for effective client user interface.

SYSTEMS ANALYST

Requires an individual with 5-10 years system/programming experience in heavy construction with particular exposure to development of construction-oriented control systems. A background in COBOL programming is required. A willingness to travel is a must.

PROGRAMMERS/ PROGRAMMER ANALYSTS

Requires a minimum of 2-4 years COBOL in a large 370 environment. Must have the ability to do nuts and bolts research and problem solving.

FIELD DATA PROCESSING SUPERVISOR

Requires an individual with 3-5 years experience in programming, systems and operations, who would desire a position of total responsibility for a field operation. Candidate should have a background in COBOL programming and be flexible to relocate as required. Immediate openings in the Gulf States Area.

For immediate confidential consideration, please send resume including salary requirements to:

MANAGER OF CONSTRUCTION RECRUITING

EBASCO Services Incorporated
CONSULTANTS · ENGINEERS · CONSTRUCTORS
TWO RECTOR STREET, NEW YORK, N.Y. 10006

An equal opportunity employer M/F

YOURS FREE!

Call for your copy today!

Source Edp's *1977 Computer Salary Survey* is now available. This authoritative and up-to-the-minute report will allow you to compare your compensation directly with professionals across the country performing the same duties you perform. It also examines in detail the strategies and techniques thousands of successful computer professionals have used to enhance their careers. After fifteen years of recruiting experience, Source Edp knows how you can gain broader professional exposure, maximize your compensation and break into management. It's all In Source Edp's *1977 Computer Salary Survey* and career planning guide.

For your FREE copy, call the Source Edp office nearest you.

East		South/Southwest	
Boston	617/237-3120	Atlanta	404/325-8370
Greenwich	203/869-5977	Dallas	214/387-1600
Hartford	203/522-6590	Denver	303/773-3700
New York	212/736-7445	Fort Worth	817/338-9300
Philadelphia	215/665-1717	Houston	713/626-8705
Union, N.J.	201/687-8700	New Orleans	504/561-6000
Wash., D.C.	703/790-5610		

Midwest		West Coast	
Chicago	312/782-0857	Irvine, Ca.	714/833-1730
Oak Brook, Ill.	312/986-0422	Los Angeles	213/386-5500
Cleveland	216/771-2070	Palo Alto	415/328-7155
Detroit	313/352-6520	San Francisco	415/434-2410
Kansas City, Mo.	816/474-3393	Torrance, Ca.	213/540-7500
Minneapolis	612/544-3600		
St. Louis	314/862-3800		
St. Paul	612/771-0544		

source edp

(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
Source Edp
Department C-21
721 Enterprise
Oak Brook, Illinois 60521

GROW WITH INTERDATA

"We Need 300 Computer Pros, Now!"

This year will be an important one for Interdata, and an important one for you, should you join our team. By the end of 1977 Interdata will grow faster than the industry average of 35%. To meet this goal we will need plenty of additional talent . . . your talent. Now's your chance to find out what it's like to be with a winner, where there's always plenty of room to move ahead.

What does this mean to you? When you come to Interdata you get a whole different feeling. One of being supercharged. Of wondering at 5 o'clock just where the day went. You feel creative. And important. It's great being a part of success, and Interdata is certainly one of the world's top computer companies.

My goal is a big one. Recruit 300 computer professionals in the next four months to help us respond to the growing demand for our products. We have openings in marketing and sales, hardware and software development, systems analysis, and for programmer analysts, hardware engineers and computer technicians.

Going to the NCC? Contact me at Booth #1483 or at our Adolphus Hotel suite.

If you want this to be the first of many important years for yourself, drop me a line and tell me about your experience and plans. In strict confidence, of course. Or call me, Rod Lenniger, collect, at (201) 229-4040

We are an equal opportunity employer.

INTERDATA®
A UNIT OF
PERKIN-ELMER DATA SYSTEMS
Oceanport, New Jersey 07757, U.S.A

BOEING Engineers

The Boeing Company in Seattle, Washington has immediate requirements for experienced engineers in a variety of important assignments on a wide range of products as follows:

SOFTWARE & COMPUTING SYSTEMS ENGINEERS for:

- **Computers & Displays—Design and Development**
- **Microprocessor Software/Firmware Design and Development**
- **Real-Time Operational Software Development**
- **Signal Processing Software Development**
- **Software/Computing Systems Design Analysis**
- **Software & Computing Testing and Evaluation**
- **Support Software Design and Development**

Candidates must have U.S. citizenship and an appropriate BS degree or higher. Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. And living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

Look into these outstanding opportunities.

Send your detailed résumé now to The Boeing Company, P.O. Box 3707-LDR, Seattle, WA 98124.

An equal opportunity employer.

BOEING
Getting people together

SYSTEMS PROGRAMMERS

$22,000 - $30,000

100 Positions available NOW
Local and Nationwide

1-8 years experience operating systems internals on medium or large scale systems

Growth Potential
Excellent Benefits
FEE PAID

Forward Resume in confidence to:

PERSONNEL
CONSULTANTS, INC.

215 Gateway Towers
Pittsburgh, PA 15222
(412) 471-6103
Corporate Inquiries Invited

DATA PROCESSING INSTRUCTOR

Full-time position with major assignment for afternoon and evening instruction with occasional weekend assignment. Master's degree required with teaching knowledge of Cobol, RPG and Business Administration. Send resume to: Denzil M. Bell, Kellogg Community College, 450 North Avenue, Battle Creek, MI 49016.

Section Manager-Language Development

You will be part of our Software Development organization and have total responsibilities for 8 to 10 major projects plus a staff of approximately 30 people.

Your primary charter will be to:

- Develop compilers for state-of-the-art hardware.
- Staff and manage the language group.
- Define new projects to be developed and product strategies to be implemented.
- Interface with Hardware Development groups.

This is a unique opportunity for a management-level candidate to join the fastest growing minicomputer company in the business. Data General. In nine years our sales have gone from $1 million to over $161 million. We offer competitive salaries, liberal benefits and the challenge of change.

You must be able to demonstrate a proven track record as a project manager in a software development environment, have experience in developing one or more compilers, and have a strong desire to take projects from conception to market.

BS and MS in a technical discipline is highly desirable, strong technical interest a must. Please forward your resume to Don Bateman, Director of Personnel, Data General Corp., 15 Turnpike Rd., Westboro, MA 01581. All responses will be held in strict confidence and acknowledged within two weeks.

Data General

An equal opportunity employer M/F

position announcements | position announcements | position announcements | position announcements | position announcements

SENIOR SYSTEMS ANALYST

Corporate 5 year planning has identified the need for an additional Senior Systems Analyst. This position requires a minimum of 7 years experience in manufacturing including installation of an integrated labor system. Candidates must have a college degree, preferably in manufacturing or business. An MBA is highly desirable.

This position offers good opportunity and high visibility to a self-motivated individual with an inquisitive nature. Operation is a growing 370/125 DOS/VS on-line installation.

Send resume to:

Morris Irby

FLEETGUARD INC.

Route 8 Box 39 Cookeville, Tenn. 38501

An Equal Opportunity Employer M/F

EDP WITH NCB

PROGRAMMER ANALYSTS

SYSTEMS ANALYST

Consider the information services divisions of National City Bank. Organized to support NCB and also market DP services, our responsibilities include banking and non banking applications ranging from general ledger to integrated corporate financial services, EDP auditing, and electronic funds transfer. Tops in the banking and financial fields, the demand for custom developed, specialized software and package installation is growing. Additions to staff are needed in:

SYSTEMS DEVELOPMENT
PACKAGE INSTALLATION & SUPPORT
DATA SYSTEMS AUDITING

All candidates must have three to five years EDP experience with big system OS background and a combination of the following qualifications: COBOL, BAL, DOS, TP, Data Base, packages, banking and college. Individuality and creativity is recognized and rewarded.

We offer excellent working conditions in a large, modern, multi computer IBM 370 facility in the suburbs, but close to the Interstate and public transportation — market adjusted, realistic salary and competitive benefits including profit sharing.

Send resume in confidence or call:

Mr. Rauch
(216) 252-7200 (collect)

NATIONAL CITY BANK
4100 West 150th St., Cleveland, Ohio 44135
We are an Equal Opportunity Employer, M/F

Senior EDP Auditor

For large-scale, corporate-wide accounting systems

A high degree of independence and visibility will be offered to the creative professional who qualifies for this opportunity within our progressive international corporation.

Responsibilities include conducting major audits at our various, complex, computer and data processing facilities; assisting in the development of advanced EDP audit programs and techniques needed to test the integrity of data processing and the adequacy of controls; and reviewing controls during the development and implementation of new computer systems. Selected candidate will collect and evaluate data, formulate conclusions and make recommendations to management. Approximately 40% travel.

Position requires a degree in Accounting, Business or Computer Science. CIA or CPA helpful. Experience in systems design and programming preferably on accounting systems – is also necessary. Ideally, background will be on IBM 370/168 computers and include a knowledge of COBOL, VS 2 and JCL. Effective oral and written communication skills a must.

Attractive salary to $24,000, fine benefits and excellent potential for continuing professional growth. Send resume, including salary history, to: Mr. Earl J. Pearce.

SUN COMPANY
100 Matsonford Road
Radnor, Pennsylvania 19807
Equal Opportunity Employer M/F

N. C. LOCATION
FEE PAID
PROGRAMMER ANALYST or SYSTEMS ANALYST

These openings are with a N.C. firm who wants a Programmer Analyst who is ready for a Systems Analyst slot. Full systems - no coding. Environment: 370/ IMS Cobol. Health insurance preferred. Financial background OK. Manufacturing will be considered. Excellent benefits. Salary commensurate with experience.

Call or send resume to
Data Processing Dept.
PERSONNEL PLACEMENT
537D Huffman Mill Rd.
Burlington, N.C. 27215
(919) 584-5591

FLORIDA

ORANGE COUNTY GOVERNMENT
Permanent Career Positions
Excellent Fringe Benefits

PROGRAMMING SUPERVISOR — Salary $15,059, with scheduled increases, Bachelor's Degree and four years' responsible experience in Computer Programming/Cobol.

PROGRAMMER ANALYSTS — Salary $10,150 with scheduled increases and opportunity for advancements. Bachelor's Degree in Data Processing/Math with Cobol experience or High School and one year's responsible Cobol Programming experience. Burrough System/Cobol.

Send resume to Personnel Department, P.O. Box 1393, Orlando, Florida 38202. (305) 420-3257. Equal Opportunity Employe, M-F.

D.P. Manager

Medium-sized manufacturing concern located in Eastern Massachusetts seeks a strong professional manager of data processing. The candidate we seek should have a degree and prior related experience. Knowledge of mini-computer hardware and software desirable. Salary commensurate with background and experience. Interested candidates should send complete educational and work history plus salary requirements to:

CW Box 5067
797 Washington St.
Newton, Mass. 02160
Equal Opportunity Employer M/F

SENIOR PROGRAMMER/ ANALYST

FINANCIAL SYSTEMS

ALCO STANDARD CORPORATION has an immediate opening for an experienced Sr. Programmer/Analyst.

Degree combined with 5 years experience in G/L, A/P, A/R required. Previous experience with IBM equipment under OS/VS preferred.

If you qualify send resume, including salary history to:

Distribution Systems Mgr.
ALCO DATA SERVICES
1008 W. 8th Ave.
King of Prussia, PA 19406

MIDWEST CHALLENGES

IBM EQUIPMENT

Scientific Prog-Fortran IV	To $21,000
Sys Prog-SVS	To $20,000
Data Base Anal	To $20,000
Prog-COBOL	To $19,000
Prog/Anal-COBOL	To $17,000
Prog-PL1	To $15,000

Call or write Bob Gammill
(317) 257-9281
Shilowe Personnel Systems
6100 N. Keystone, Suite 657
Indianapolis, IN 46220

A licensed employment agency

MATANUSKA-SUSITNA BOROUGH

ANNOUNCEMENT OF POSITION VACANCY

Computer Programmer
$1,912-$2,517/mo

Qualifications: High school graduation or equivalent and training in the operation and programming of data processing equipment; three years of responsibility in computer programming including two years of direct responsibility.

Duties: Design, test, codes, prepares and maintains computer programs. Documents and codes data processes. Creates special reports and file extraction using generalized routines. RPG 2/CCP and government experience desirable.

How to Apply: Submit application (supplemented with resume' if desired) to Personnel Office, Matanuska-Susitna Borough, Box B, Palmer, Alaska 99645.

An Equal Opportunity Employer

DATA PROCESSING PROGRAMMER ANALYST

READY FOR GROWTH?

This established medium-sized manufacturer in Northern New Jersey offers you the opportunity to achieve success in your field. We seek a programmer anxious to grow with us. Manufacturing and 3 years' COBOL experience required. A Honeywell environment a plus. Will work on development of production and inventory systems. We offer a very good salary in the high teens and an outstanding benefits package, including profit sharing and tuition reimbursement. Position yourself for growth by sending your resume with salary requirements to: Mr. E. Lenik.

THERMO ELECTRIC
108 N. Fifth Street
Saddle Brook, N.J. 07662
Equal Opportunityy Employer M/F

Systems Programmer

American Express Company in Phoenix, Arizona is looking for an individual with SYSGEN experience in SVS in a multiple CPU environment and SVS and HASP maintenance experience.

In addition to these qualifications, it would be desirable for the successful candidate to have 3-5 years systems programming OS/VS. SVS-MVS conversion and MVS maintenance experience would be helpful. Knowledge or exposure to VM/370 and exposure to systems tuning and performance measurement experience is a plus. VM, TMS, LIBRARIAN SYNCSORT Familiarity desirable.

American Express offers an outstanding compensation package which is complimented by the southwestern lifestyle of living in Phoenix. Can we interest you in this challenging position? If so, send your resume to the Manager of Employment.

American Express Co.
P.O. Box 13781, Phoenix, Az. 85002

AMERICAN EXPRESS

An Equal Opportunity Employer M/F

Software Professionals

TELEMED Corporation is the world's largest medical data processor of electrocardiograms (ECGs) by computer. We are a profitable, fast growing public company. We seek software professionals with solid backgrounds in the following areas to fill positions creating by our expanding requirements.

REALTIME SYSTEMS

Development systems Software for realtime, fail-soft computer network consisting of PDP 11s and DECsystem 10 computers. Tasks to be performed include resource allocation, telecommunications computer-to-computer protocols, A/D sampling techiques, and interrupt-driven device handlers. We require individuals with solid experience in realtime communications, assembly language, programming, and operating systems, though not necessarily on these machines.

OPERATING SYSTEMS

We are currently upgrading our system to two KL10 computers. We need an experienced DECsystem 10 systems programmer who is interested in such jobs as performance analysis and/or modifications of TOPS10, installing CUSPS, installing new monitors, etc. Additionally, this individual would be involved in desiging and writing software to interconnect the KL10s to a network of PDP-11s.

SYSTEMS INTEGRATOR

We require an individual having a minimum of 3-5 years software experience in Assembler and Fortran who will be responsible for the integration and systems testing/checkout of mini-computer turnkey systems. This individual must be capable of formulating detailed testing procedures to test all functions of the systems being developed. Continuing work will involve performing complete detailed certification of any new software releases for this system. Hardware knowledge would be considered a plus.

TELEMED provides a stimulating and challenging environment for qualified individuals. TELEMED's computer systems include DEC KL10s, PDP-11s, Xerox Sigma 5s and Interdata 7/32s. We provide resources to maximize your efficiency and technical achievements through your own CRT for timesharing, or hands-on mini-computer machine time. Salary commensurate with experience. Please indicate areas of interest in reply:

SOFTWARE AND PROFESSIONAL RECRUITMENT

TELEMED CORPORATION
2345 PEMBROKE AVENUE
HOFFMAN ESTATES
ILLINOIS 60195
An equal opportunity employer

position announcements | position announcements | position announcements | position announcements | position announcements

SYSTEMS PROGRAMMER

The successful applicant must have considerable experience with COBOL, OS Intervals, SYSGENS, telecommunications and performance monitoring. Knowledge of Assembler language necessary and knowledge of CICS, Data Base, 3705, and VTAM/NCP is desirable.

Send resume; including salary requirements, to:

MONTGOMERY COUNTY PUBLIC SCHOOLS
Supporting Services Personnel
850 Hungerford Drive
Rockville, MD 20850
Equal Opportunity Employer

SUCCESS SYSTEMS INC.

(agency)
THE PERSONNEL AGENCY SPECIALIZING IN COMPUTER PEOPLE.

Experienced programmers, technicians, operators available as well as graduates of an excellent computer school.

For Pros or Beginners Contact:

John Jasper
SUCCESS SYSTEMS, INC. (agency)
3435 Harlem Road
Cheektowaga, NY 14225
(716) 834-4457

Finding the best is what we do best.

Our staff is expert at finding "the best person for the job."Most of our placement managers are C.P.A.'s,C.A.'s, controllers or systems managers, the largest most experienced financial, banking and data processing service in the world.

We have expanded to 50 offices throughout the United States, Canada and also Great Britain.

We believe the combined talent and skill of Robert Half employees made us what we are today.

Maybe we're just what you're looking for.

ROBERT HALF PERSONNEL AGENCIES

World's Largest Financial & EDP Personnel Specialists.

Call us.
We're in the White Pages in key areas throughout the United States, Canada and Great Britain.

To the Computer Professional who knows Texas isn't the only place with wide open spaces...

We'll be in Dallas to talk about wide open spaces . . . the one at Prime.

If you're looking for room to grow, space to create, and limitless opportunities for advancement, you'll find them at Prime.

In the past year alone, opportunities for significant contributions have doubled — along with our sales and facilities. So, we've got a lot of room for Computer Professionals who want to expand their horizons.

Product Planning Program Management

We are looking for professionals experienced in either software or hardware to play major roles in the determination of Prime's future product strategies and the management and control of these developments. These positions require a strong technical background coupled with a clear understanding of the small to medium scale interactive computer systems marketplace. A Bachelor's or Master's degree in Engineering or Computer Science coupled with at least 5-10 years experience in hardware or software development are required. In addition, we would prefer recent experience In product planning, market planning or program management.

CPU Design Engineers

Requires minimum of 3 years of digital design experience closely related to mini-computers and associated central processor options. Additional microprogramming, timeshare, or programming experience an asset.

Advanced Development Engineers

Requires 5 years of developmental experience in modern computer architecture and software, particularly operating systems. MSEE/ Computer Science preferred.

Senior Research Engineers

Our rapidly expanding research group is seeking senior engineers and computer scientists to pursue advanced research activitles in the areas of computer architecture, data management, network, operating systems and circuit technology. The ideal candidate should have a PhD with several years of academic or industrial research experience and a strong desire to have a major impact on our future products.

Power Supply Engineers

Requires BSEE with computer related design experience in switching regulator or off-line switching power supplies. Familiarity with high frequency P.W.M. techniques and AC power distribution/power conditioning for use in world-wide applications desirable.

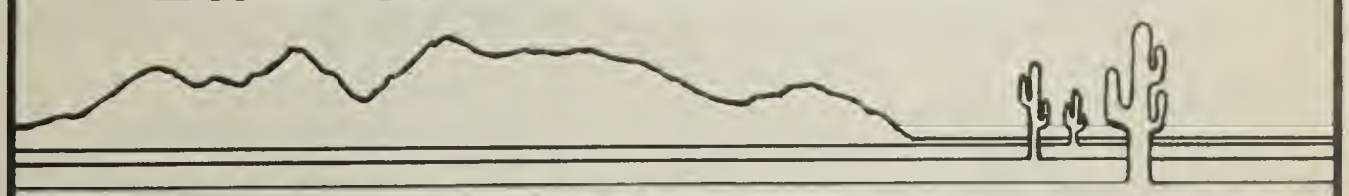
CPU Microcoders

Requires BSEE/CS and interest in real time/multi-tasking operating systems; computer logic; program design; and data structures. Programming skill in Assembly and one high level language needed. Will design, implement, and test CPU control words and microcode algorithms.

To arrange an interview with Prime while attending the NCC, call collect to Byron Gayman in Engineering at (617) 879-2960, Ext. 294, or send your resume to John Reinhart in Empioyee Reiations.

PRIME
PRIME COMPUTER, INC.
145 Pennsylvania Avenue, Framingham, MA 01701

Talk to Prime at the NCC.



DATA PROCESSING OPERATIONS TEACHER

Long Island, N.Y. secondary school — must know latest hardware, operations, and be competent in Cobol and/or RPG. Degree desirable — business experience essential.
Send Resume to CW Box 5070
797 Washington St.
Newton, Mass. 02160

TECH. CONSULTANTS

New Eng. corp seeks Indiv's with broad IBM/OS techn and systems bkg to provide internal corp support to multi-div dev staffs. Very visible positions with future mgmt. potential. Salaries to $23,000 (Fee paid) Contact Stan Durbas for details.

ROBERT HALF PERSONNEL AGENCIES
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

HOSPITAL EDP CONSULTANT

Growing CPA firm seeks an aggressive, top notch hospital EDP consultant to occupy a key position in its St. Louis office. The successful candidate initially will be assigned to an exciting, leading edge project in a medical center environment. Qualifications must include:

- At least 3 years in systems design and programming, minicomputer, data base management system, or communication system experience
- Experience in implementing hospital financial systems
- Willingness to travel up to 50%

Qualified applicants should send resume and salary history in confidence to:

CW Box 5060
797 Washington St.
Newton, Mass. 02160

Question:

WHERE? Can you interview with over 150 of the Nation's top companies?
WHO? Are these companies and where are they located?
WHAT? Type of positions do they have for you?
HOW? Do you go about talking to them?

Answer:

WHERE! In our suite at the Adolphus Hotel during the National Computer Conference in Dallas, June 13-17.

WHO! NCR, EMR, ECI, COLLINS, E-SYSTEMS, FEDERATED STORES, GOULD, STANDARD REGISTER, REYNOLDS & REYNOLDS, TYMSHARE, FLUOR, EL PASO GAS ITEK, WESTINGHOUSE, OPTIMUM SYSTEMS, COMPUTER SCIENCES CORP., HOBART, McDONNELL-DOUGLAS, WESTON INSTRUMENTS, OCCIDENTAL PETROLEUM and many, many more fine companies.

WHAT! You name it from entry level to top EDP Management. Salaries to $45,000. Programmers, Analysts, Operations, Sales, OR, Technical, Commercial, Manufacturing, Banking, Engineering, Insurance, Transportation and whatever. Positions located throughout the U.S. and some overseas.

HOW! Send us a copy of your current resume . . . Indicate your present salary . . . geographical preferences and whether or not you will be attending the NCC in Dallas. If you are attending, we will arrange to talk to you there. If not, we will contact you at your home or office (whichever you prefer) and put you in touch with our clients.

NOW! Get that resume in the mail today . . . we will take it from there.

Mail to: Bob Cole

EDP Search

A Division of Engineering/EDP Search, Inc.
Personnel Consultants
84 NE Loop 410, Suite 124E
San Antonio, Texas 78216

COMPUTER PROFESSIONALS

BCS has achieved widespread recognition and customer commendation as a growing leader offering a steadily expanding line of state-of-the-art computing services.

This could be your opportunity to join our fast-paced McLean, Virginia facilities – relied upon by many businesses, industry and government organizations, small and large to fulfill their demanding data processing requirements.

Immediate openings are in the following areas:

Applications Analysis

Financial systems, MIS and data base management systems (IDMS and $2000)

APL Internals/File Systems

Knowledge of VM/CMS desired.

Quality Assurance

370 OS/TSO systems software development and certification.

TSO Systems

Performance Monitoring, Multi-processing, MVS, VS and VM

Systems Programming

VM systems software, BAL, PL/I, communications.

Individuals selected will enjoy excellent career potential along with generous company paid benefits and compensation programs.

For confidential consideration, send resume and salary history to Gordon Grant.

BCS BOEING COMPUTER SERVICES, INC

Eastern District

7926 Jones Branch Drive, McLean, Virginia 22101
An Equal Opportunity Employer M/F

DATA PROCESSING EXECUTIVE

Our client, a major, progressive company with sales exceeding $500-million annually, is seeking an EDP professional with proven ability to achieve results/objectives in a people-oriented environment. Strong communication skills and the ability to interface with top corporate management are essential. A seasoned EDP executive with Honeywell 66 and/or Data Base experience is called for.

Excellent starting salary, comprehensive benefit package and a stimulating working environment are offered along with a convenient Southern location.

Interested applicants are urged to forward a detailed resume, including salary history and requirements, in strict confidence to:

CW Box 1865
810 Seventh Avenue, New York, N.Y. 10019
An Equal Opportunity Employer M/F

Systems Analysts

Let's Talk About Fresh, New Ideas . . . State-of-the-Art Opportunity, and . . .

how you can put it all together with NCR, the leader in the manufacturing, marketing and service of POS Terminals and Data Processing Systems. We're working on advance systems for the retail, commercial, industrial, medical, educational, governmental and financial markets. These are major business applications design and development projects involving transaction oriented, distributive processing systems, interactive systems, data based management systems, micro-processor terminal systems, and others in a real-time or batch environment.

The superb hardware provides unparalleled creative latitude. You'll work with some of the newest and most sophisticated systems available: modular in architecture, it features an Internal Transfer Bus which interfaces with unique subsystems. This distributed intelligence technique opens new avenues to processing flexibility and imaginative software concepts.

Opportunity, Career Path . . . Technical Advancement Qualifications

We offer a professional environment where one's ability is complemented by the unlimited opportunity in the field of application programs software development, and a career path designed to prevent stagnation and technical obsolescence. A full complement of employee benefits programs are provided, including such things as a stock purchase plan, a company paid life and health insurance plan, etc. Recreation facilities are also provided, such as a 36-hole golf course, tennis courts, . . . just to name a few.

The Analysts we seek will preferably be college degreed, with one or more years of programming and/or systems analysis experience. In lieu of a degree we will consider equivalent experience.

. . . And Our World Headquarters Location

Dayton, Ohio is a strategically located mini-metropolis, offering the cultural, recreational and educational advantages of a large city in the atmosphere of a friendly town. Beautiful residential areas in town, or in the country are just a short drive from NCR's headquarters complex.

Interested?

If challenge, opportunity, technical development, career path, and state-of-the-art are high on your list of job priorities, as well as an excellent community in which to raise a family; then forward your resume or jot us a note and we'll send you our application form. Send to:

NCR

Manager Marketing Placement
Domestic Marketing Division
NCR Corporation
Dayton, Ohio 45479

An Equal Opportunity Employer.

MEDICAL INFORMATION SYSTEM DEVELOPMENT

PROGRAMMER/ANALYST

A Research Institute at the Indiana University Medical Center (Indianapolis) is seeking a bright and dedicated Programmer/Analyst to join in the development of a medical information system with national significance. Work involves networking, transaction processing and the development of an in-house data base system and an automated medical decision-making system. Applications extend to the clinical lab, the pharmacy, the medical record and the operation of the medicine clinics. Opportunity for strong interaction with users and responsibility for major application systems from design through implementation.

Position requires B.S. in Computer Science or equivalent technical degree and one to three years of employment as a Programmer/Analyst. Experience in the development of data management systems and/or PDP 11 RSTS, BASIC PLUS and/or RSX 11-M desirable. Experience with medical applications not needed.

Salary from $14,000-18,000 depending upon qualifications and experience. Please send resume (if possible, transcript) to Mrs. Joanne Lepper, 1001 West 10th Street, Indianapolis, Indiana 46202.

An Equal Opportunity Employer M/F

engineering

The Opportunity is Here.

Amdahl, one of the most dynamic companies in the computer industry, has some exceptional opportunities for some exceptional people. The work is challenging, the environment friendly and our compensation and benefits package is excellent. If you're a qualified candidate, the opportunity you desire may be here... at Amdahl.

Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

SOFTWARE ENGINEERS

You will be writing mini-based programs to provide and control the human interface to Amdahl CPUs. You will work with Hardware Design Engineers and Field Service Engineers to determine requirements. You will be part of a team of Software Engineers as you utilize structured techniques throughout project development. You must have an MSEE or MSCS or the equivalent. You have both large and small systems experience and you will find it helpful to possess some operating systems experience. Electrical Engineers with a software background and software interests should apply. Please indicate 436-E on your response.

amdahl

Human Factors Specialist

You will be working with a design team, employing your computer system software and hardware capabilities to identify and solve human factor problems of CRT displays and formats, switch and keyboard actions, legibility studies, and numerous related projects.

This position requires a BS or BA in Human Factors, Ergonomics, Industrial Design, or equivalent experience and a working knowledge of computer systems and computer software.

Tektronix, Inc., develops, manufactures, and markets internationally recognized precision electronic measurement instruments, computer peripherals, and related electronic instrumentation. Located near Portland, Oregon, we are within a two-hour drive of the Cascade Mountains or Ocean Beaches. The close-by nature playgrounds and the City of Portland provide for a variety of recreational and cultural interests.

Salary is open. Benefits include educational support, insurance and profit sharing programs.

Please send a copy of your resume and salary history to: Sandra Lowe, TEKTRONIX, INC., P.O. Box 500, C87, Beaverton, OR 97077.

An Equal Opportunity Employer M/F

Tektronix
COMMITTED TO EXCELLENCE

Microcomputer/Memory Systems & LSI Field Sales Engineers

You've never had more to sell.

You know the value of a good product line. So consider what Intel can offer you in microcomputer and memory systems sales and applications. Our microprocessors are the industry's leaders in both sales and technological superiority. And we're the leading independent supplier of OEM add-on memory systems. Behind all of this is the company that continues to stack one successful year upon another, with 1976 showing sales up 65.2% to $226 million and earnings up 54.9%. The bottom line is exceptional opportunities in major cities throughout the U.S. And you may qualify if you have a technical degree plus a background fitting one of these openings.

DALLAS INTERVIEWS—JUNE 13-16

To arrange a local Dallas interview and get all the details on a career with Intel, call Ed Haynes at (214) 241-9521 on June 13-16 from 9AM to 6PM.

District Manager Systems Sales

We need Field Sales Managers capable of motivating and directing the efforts of direct sales personnel and manufacturers' reps in the OEM microcompuler and memory systems marketplace. Requires 5-7 years experience in sales and sales management in microcomputers or related field.

LSI Field Sales Engineers

Experienced field sales engineers with proven ability to penetrate new markets and develop existing accounts for memory and microcomputer semiconductor components. 3-5 years sales experience in the semiconductor industry preferable.

LSI Field Application Engineers (Microprocessor Components)

Will provide technical support to our direct field sales, manufacturers' reps and customers with application information on Intel microprocessors. Strong background in microprocessor hardware and programming required.

Systems Field Sales

Experienced field sales engineers with demonstrated ability to penetrate new markets and develop OEM microcomputer and memory systems accounts. Requires 3-5 years sales experience in related field.

Field Application Engineers (Systems)

These applications engineers will provide technical support to our direct field sales, manufacturers' reps and customers with application information on Intel microcomputer systems.

Marketing & Applications Engineers.

You may qualify for one of the positions listed below if you have a BSEE (MSEE and MBA preferred) plus appropriate background. Based at our Santa Clara, California, headquarters, you'll enjoy life on the San Francisco Peninsula, often called the most livable place on earth. Specific opportunities include:

Sr. Product Marketing/Planning Engineers

Several openings exist in such Intel product areas as static and dynamic RAMs (associated with mini- and large computers), bipolar PROMs and CCDs for engineers with 8-10 years experience in computer or memory design.

Additional openings in other product areas exist for engineers with 6-7 years in new product planning, market definition, introduction strategies, pricing, data sheets, competitive market analysis and long-range planning. Heavy emphasis on product marketing and engineering. Advanced planning and financial analysis of the semiconductor industry.

Senior Applications Engineer

You will be responsible for generating technical information via application notes and articles on Intel's dynamic RAM memory components. Involves strong technical interface and assistance with customers using Intel products and periodically conducting memory systems design seminars as lecturer. Requires 4-6 years experience.

If you won't be able to call, please send your resume, including salary history, in confidence to Intel Employment, Attn: Ed Haynes, 3065 Bowers Avenue, Santa Clara, CA 95051. An equal opportunity employer m/f.

intel

Systems Engineer

$1435 to $1744

per month

Requires three years experience in computer programming and one year in systems development, apply by 6/15/77. Send resumes to

PERSONNEL DEPT.
City of Newport Beach
3300 Newport Boulevard
Newport Beach, Calif. 92663

Banking

Data Processing

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking systems or programming experinece. Send resume in confidence to Jim Morris, Houser Martin, Morris & Associates, 1621 114th S.E., Suite 219, Bellevue, WA. 98004.

PROGRAMMER/ANALYST
(Re-opened)

Would you like variety and responsibility on a college campus? Programmer/Analyst — Educational Systems develops systems and application software, manages PDP 11/45 RSTS/E on campus and teaches work shops. Full-time position, available immediately; requires bachelor's degree in related discipline, one high level and one assembler language, and related experience, including one year as programmer or programmer/analyst. Submit resume, current and/or expected salary, and date available to: Mr. R. Whitcomb, Personnel Director, P.O. Box 599, Appleton, WI 54911, by June 20.

LAWRENCE UNIVERSITY
Equal Opportunity Employer

position announcements | position announcements | position announcements | position announcements | position announcements

EDP Professionals

The Jarvis Walker Groups, specialists in Data Processing Recruiting, represent client companies . . . in all areas of industry . . . across the nation. There continues to be extensive client needs at various technical levels; with particular interest in candidates experienced in the development of mini-computer systems (applications & software); & individuals with excellent project management skills in a 370/OS/VS environment. Salaries from $16,000-$30,000.

If you feel that your present position does not afford you the necessary career growth; please call or send letter/resume to the appropriate office & one of our associates will be happy to discuss specific client situations with you.

the jarvis walker group

N.Y.	535-5th Ave., N.Y.C. 10017 (212) 867-2650
N.J.	349 E. Northfield Rd., Livingston, N.J. 07039 (201) 994-3773
CALIF.	11222 La Cienega Blvd., Inglewood, CA. 90304 (213) 670-7353

IMS IN IOWA

RESYSTEMATIZE HEALTH CARE APPLICATIONS INTO DATA BASE MODE. GAIN NEW TECHNICAL SKILLS WHILE APPLYING YOUR EXPERTISE WITH MINIMAL CONSTRAINTS. WORK AS A SENIOR PROGRAMMER/ANALYST IN DES MOINES. RELOCATION AND INTERVIEW EXPENSES PAID FOR. STARTING SALARY TO $19K.

HARDWARE IS IBM S/370 158 MVS WITH 3270'S AND TSO. YOUR BACKGROUND SHOULD COVER 4 YEARS OF COBOL AND OS JCL. TWO YRS. OF IMS WOULD BE A PLUS. IN ORDER TO JOIN THIS ELITE GROUP OF PROFESSIONALS PLEASE CALL MR. D. MOITRA AT: 415/781-5260.

COMPUTER PROFESSIONALS
UNLIMITED AGENCY 418
CLAY STREET, S.F. CA 94111

CPU

FOX and Associates, INC.

EDP-SEARCH SPECIALISTS

Serving:

ATLANTA AND THE SOUTHEAST
NEW YORK AND THE NORTHEAST
CHICAGO AND THE MIDWEST

OUR CLIENT COMPANIES PAY ALL CHARGES YOU HAVE NO FEE - NO CONTRACT

Current Search Assignments Include:

$45,000	MIS Director - Sunny South
$23,000	D.P. Manager - Sunny South
$28,000	Sr. Programmer Analyst
$28,000	Consultant-Software - Northeast
$25,000	Consultant-Software-Midwest
$25,000	Pre-Sales Consultants - Several
$40,000	Package ++ - Software Sales (At Least)
$20-$26,000	Training/Installation-Software
$22-$28,000	IMS/OS Programmer Analysts
$18-$30,000	Sales Supp Personnel (Several)
$18,000-	CPCS-Programmer Analyst (South)
$20,000-	++++-CICS Prog Analyst (South)
$18-$27,000	Tech. Support Personnel (South)

Hundreds of other positions available throughout the United States. Our only business is Data Processing. We are "EDP Recruiting Specialists"

YOUR RESPONSE WILL BE HANDLED IN THE HIGHEST OF CONFIDENCE; NO REFERRALS OF YOUR RESUME WITHOUT FIRST DISCUSSING THE POSITION WITH YOU. - ALL INQUIRIES WILL BE ACKNOWLEDGED.

Please rush your resume today to:

• Mr. C.M. Fox, President
FOX AND ASSOCIATES, INC.
Suite 2104 Cain Tower,
229 Peachtree Street, N.E.,
Atlanta, Georgia 30303
Corporate inquiries are invited.

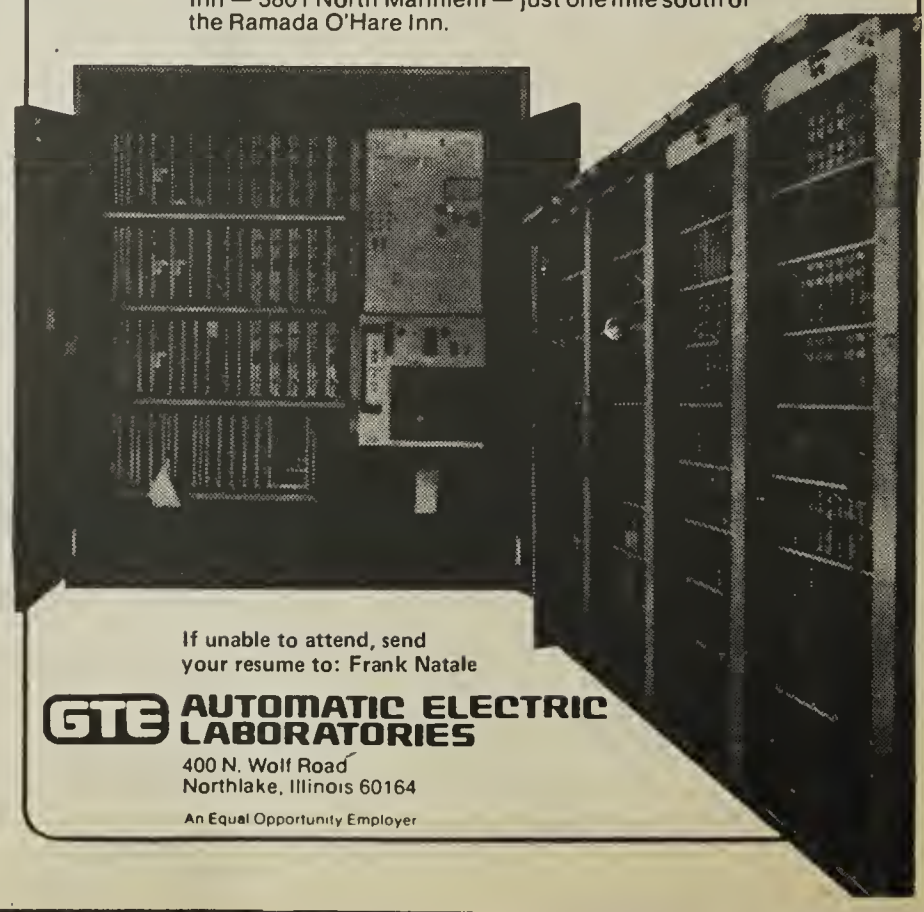
Electronics and Computer Professionals

Are You Attending icc77 in Chicago?

Visit With Our Top Management and Discuss Career Opportunities With GTE Automatic Electric Laboratories. During the Conference Stop By Our:

Career Hospitality Suite

MONDAY, JUNE 13 from 5-9 P.M. at the Holiday Inn — 3801 North Manhiem — just one mile south of the Ramada O'Hare Inn.



If unable to attend, send your resume to: Frank Natale

GTE AUTOMATIC ELECTRIC LABORATORIES
400 N. Wolf Road
Northlake, Illinois 60164

An Equal Opportunity Employer

PROGRAMMERS/ANALYSTS

The Dayton area's largest and most progressive financial institution has openings for experienced Programmers and Systems Analysts.

Two years NCR NEAT/3 or NCR COBOL experience desired. Experience with CIF, CIRF and/or commercial bank applications preferred.

We offer an excellent starting salary plus an outstanding fringe benefit program. Send resume to:

Personnel Division

Winters

National Bank & Trust Co. Winters Bank Tower
Dayton, Ohio 45401
Affirmative Action Equal Opportunity Employer

OPPORTUNITIES IN COMPUTER GRAPHICS

Two outstanding Computer Graphics opportunities presently exist for individuals to develop sophisticated computer graphics-oriented applications in three areas as diverse as structural analysis and budget planning. A strong background and interest in interactive graphics and data base management techniques are required and experience with both refresh and direct view tubes and CDC 6000 series computers helpful.

- PRINCIPAL RESEARCH CONSULTANT

Along with the above, 10-15 years computer experience with most current 5 being heavily dominated by interactive graphics is required. You must be strongly user oriented and capable of assuming a leadership role in determining and directing a market thrust for graphics. Good written and oral communication skills required, and a Masters in Computer Science, Math or related engineering field is preferred.

- RESEARCHER

In addition to the above, 3-5 years computer experience with strong interest in interactive graphics required. You will be required to assume and maintain existing computer codes and develop new ones. B.S. in Computer Science, Math or related engineering field preferred. You will be considered with less experience but must have exceptional academic background and a Masters Degree.

Battelle

Columbus Laboratories
505 King Avenue Columbus, Ohio 43201
An Equal Opportunity Employer

We are one of the world's leading independent contract organizations and can offer broad opportunities for professional growth along with excellent salaries and benefits. To apply, send resume stating specific position in which you are interested in confidence to L. Hill.

OMICRON

Consultants to the Computer Industry

SYSTEMS SOFTWARE OPPORTUNITIES

San Francisco Bay Area

OMICRON has several clients located in the San Francisco Bay area actively seeking Computer Professionals with the following skills:

SYSTEMS PROGRAMMERS

Excellent opportunities exist in a software support group requiring experience in IBM/370 VS1, VS2, SVS or MVS JES3 experience highly desirable. Salaries to 27K.

DATA BASE ADMINISTRATOR

Requires several years experience in data base (IMS) technology. Will direct the corporate data base development and control. Salary to 30K.

Relocation and interviewing expenses are paid by client companies.

For these and other Systems Software opportunities, please call or write, in confidence, to:

OMICRON Inc.
415/546-7200
ONE ECKER STREET
(Ecker & Stevenson Streets)
SAN FRANCISCO, CA 94105
Exclusively Employer Retained Agency

EDP POSITION

Harris Computer Systems, a manufacturer of large medium-scale digital computers, has several positions available. Due to rapid growth, expansion positions are available at our divisional Ft. Lauderdale, Florida location in addition to key locations throughout the U.S.

PRODUCT MARKETING MANAGER

Senior marketing position with responsibility for penetration of markets. Requires BSEE, physics, computer science or equivalent. Experience should include significant sales background, planning and forecasting, computer design or systems analysis, and in-depth mainframe exposure. In addition, this staff position will coordinate product planning and enhancement and will interface directly with marketing, systems and customer representatives.

FIELD ANALYSTS

3-8 years experience in sales support. Expertise in operating systems and FORTRAN and COBOL necessary. VS is a plus factor. Degree in math or computer science.

INSTRUCTORS

To develop and present hardware courses on computers and peripherals. Disk experience necessary plus degree. Both positions require 3-5 years programming experience and operating systems knowledge.

TECHNICAL WRITERS

Digital logic background with 2-4 years experience in technical writing. Mil-spec documentation desired.

DIAGNOSTIC ENGINEERS

2-8 years experience with emphasis upon design of diagnostic software and diagnostic operating systems. Heavy machine language and logic design background. We also prefer hardware applications in design and coding diagnostics.

DESIGN AUTOMATION PROGRAMMER

The individual we seek must possess a bachelors degree. In addition, we prefer a candidate with 3-5 years experience in the electronic manufacturing field. Experience should also include the analysis and programming of placement routing and evaluation of inter-connection design problems.

FIELD SERVICE ENGINEER

Candidates must have 3-5 years of hardware and software knowledge, as well as installation, troubleshooting, maintenance and repair of computer and peripheral hardware. Typical candidates will have background with CDC, Univac, Honeywell or IBM CPU's.

BENCHMARK ANALYSIS ANALYSTS

Marketing oriented systems support with in-depth commercial/scientific applications exposure. Degree plus FORTRAN and COBOL required. Excellent springboard to systems management or field support. Will operate out of Ft. Lauderdale.

MECHANICAL ENGINEER

New grad or 1-2 years experience in electronics field. Will design and interface with engineering to do package design and temperature rise calculations.

Send your detailed resume in complete confidence to W.D. Taylor, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Ft. Lauderdale, Florida 33309.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

An Equal Opportunity Employer Male and Female

Director of Data Processing

International King's Table, Inc., a rapidly growing publicly-owned restaurant chain, headquartered in Eugene, Oregon, seeks a Director of Data Processing.

Individual will be responsible for planning, development and implementation of a data base management system, as well as significant additions to the company's information system. Applicant should have direct experience with a time sharing system and will be responsible for a current staff of seven, utilizing a Digital PDP 1140 RSTS/E system.

Requirements: Applicant must have ability to supervise the growth of a DP system for a company which plans to double sales in three years; must have a strong business background; 5-9 years experience in data processing, with 3-4 years of supervision experience. Ability to perform system analysis, design and programming necessary. Successful candidate will have college degree and large systems planning and management experience.

The position offers excellent salary and benefits. Send your resume, including salary history, in confidence to:

V.P. of Finance
P.O. Box 10766
Eugene, OR 97402

position announcements | position announcements | position announcements | position announcements | position announcements

PROGRAMMERS AND ANALYSTS

Free Employment Service
Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

Don't just look for a new job...
CYBERSEARCH

EDP CAREERS

Present client needs have created a multitude of challenging positions for data processing people. Here are some of them:

• SYSTEMS SOFTWARE (2) 370/OS/DOS	$19-22K
• SYSTEMS ANALYST (4) 360/370 OS/DOS	$23-25K
• SR. PROG. ANALYST (2) 370/OS/DOS-BAL, COBOL	$18-22K
• SR. PROG. ANALYST (7) 370/OS-BAL, COBOL, CICS	$18-21K
• SENIOR PROGRAMMER (6) 370/OS-BAL, CICS	$16-21K
• PROGRAMMER (11) 370/OS-BAL, COBOL, CICS	$15-20K
• PROGRAMMER/ANALYST (5) Sys III - RPG II	$14-18K
• TECH SUPPORT SPECIALIST 370/DOS- BAL, CICS	$17-19K

CONTROL DATA CYBERSEARCH
an employment agency of
CONTROL DATA CORPORATION

214 N. Michigan Ave., Rm. 600,
Chicago, IL 60601 (312) 454-8490

2000 West Loop South
Houston, Tx 77027 (713) 965-5666

SOFTWARE SALES
Western USA & Canada

Computer Associates, one of the world's leading independent software development and marketing organizations, is seeking top software marketing professionals.

Our product line includes the highly successful CA-SORT system with over 1600 installations throughout the world as well as other software products for DOS, OS, VS and a full line of software for VM/370. Sales reps are needed for the Western States and Canada. Previous experience with system type packages is desirable. If you are not afraid to work and expect to be well compensated for your efforts, contact us.

Starting salary is excellent and full insurance benefits are provided.

Please send resume to Mr. Charles B. Wang, President, Computer Associates 655 Madison Avenue, New York, New York 10021. Or call collect (212) 355-3333 today.

COMPUTER ASSOCIATES

SUPERVISOR
SOFTWARE SYSTEMS DEVELOPMENT

Our products incorporate minicomputers as process, communication and database controllers. In this newly created opportunity, you will define software requirements and design appropriate architecture, select minicomputer hardware, perform trade-off studies and prepare user manuals. Experience required in documentation, scheduling and budgeting, job estimating and proposal preparation. BSEE degree or Computer Science Curriculum, background in Data General or DEC hardware and 8 - 10 years experience, with five years in a supervisory capacity preferred.

SENIOR SYSTEMS PROGRAMMERS

Openings in our Utility Load Management and Space Divisions for designing programming requirements through integration and debugging of programs as well as helping to establish budgets and scheduling. A BS degree, courses in programming and 4 - 6 years of programming experience on minicomputers and Fortran programming for multi-task real-time disc operating systems a must. Data General minicomputer experience also required.

SYSTEMS ENGINEER/PROGRAMMER

Digital design and maintenance of all systems related to our industry leading Computerized Tomography (CT) Scanner. BSEE plus 5 years experience emphasizing digital circuitry, computer diagnostic capability, Fortran, and NOVA assembly language required.

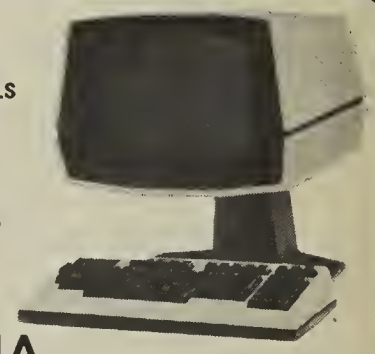
Submit resume including salary history or contact Lee Binnig at American Science and Engineering, Inc., 955 Massachusetts Avenue, Cambridge, Massachusetts 02139, (617) 868-1600.

An Equal Opportunity Employer m/f

AS&E®

TEC, Incorporated

THE FIRST COMMERCIAL SUPPLIER OF CRT TERMINALS



ANNOUNCES
CRT SALES POSITIONS
IN
CHICAGO • PHILADELPHIA
BOSTON • COLUMBUS
HOUSTON • WASHINGTON D. C.

Do You Qualify?

- EXPERIENCED DATA PROCESSING PERIPHERAL HARDWARE SALES REPRESENTATIVE
- DEMONSTRATED SUCCESS WITH RECORD OF QUOTA ACHEIVEMENT
- PREPARED TO EXERCISE FIELD SALES MANAGEMENT
- ENTHUSIASTIC, SELF MOTIVATED, CERTAIN OF SUCCESS
- REQUIRES HIGH EARNINGS FOR CONTINUED IMPROVED STANDARD OF LIVING

TEC, Incorporated was founded in 1958 and is a member of the American Stock Exchange.

TEC's sales organization is now being developed to market it's full line of CRT terminals, Floppy Disc Memory System, thermal and impact printers to the OEM and End–User market place. More than 20,000 TEC CRT's have been installed since 1970. Those individuals selected will be the sales management base for planned corporate and product line expansion. This is that rare opportunity for successful sales people to move into sales management with an established, proven and profitable data processing manufacturer.

Forward your resume and salary requirements to, or telephone, Jerry Gower for an interview appointment. Or stop at TEC's Booth No. 1838–40 at the N.C.C. in Dallas.

TEC, Incorporated

Stability/Age/Beauty

2727 NORTH FAIRVIEW AVENUE • TUCSON, ARIZONA USA 85705 • (602) 792-2230

AN EQUAL OPPORTUNITY EMPLOYER M/F
COMMITTED TO AFFIRMATIVE ACTION — A TEC, INCORPORATED CORPORATE POLICY

EDP AUDITOR

Immediate opening within our Internal Audit Department. The successful candidate must possess a B.S. Degree in Business Administration; broad background in systems analysis, excellent communicative skills and a working knowledge of COBOL and BASIC languages, IBM and HIS systems software, time-sharing and database applications. Previous EDP audit experience helpful. Responsibilities include performing operational audits of data processing activities, evaluating internal control and security of systems under development; assisting other audit teams in providing EDP audit support and developing and maintaining audit extract programs.

Salary commensurate with experience. Comprehensive benefit program. Send resume with salary history to:

CW Box 5071
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity/ Affirmative Action Employer

data processing

Seattle Openings

Programmers
Programmer/Analysts

Exceptionol Orgonizotion

Advonced DP Focility

Excellent Coreer Opportunity

Superb Living Conditions

Year after year SAFECO has had one of the best records in the insurance industry for financial growth and profitability. Consider putting your skills to work in our multi S/370 environment with MVS, IMS, TSO, etc., on the development of leading-edge applications and assisting us in furthering our success.

For additions to our staff, we'll consider candidates with two to four years of Programmer or Programmer/Analyst experience using COBOL and/or BAL. You'll find our working environment superior to most with a package of benefits which compares with the very best.

CALL TOLL FREE: 1-800-426-7646

SAFECO

Personnel Department
Safeco Insurance Companies
Safeco Plaza
Seattle, WA 98185
Equal Opportunity Employer M/F

PROGRAMMER/ ANALYSTS

NCR Data Processing Division hos immediate openings for Progrommer Analysts in:

- **MIS Applications Programmer**
- **Software Development**
- **Firmware**
- **Diagnostic Programming**
- **O/S Project Lead**

(Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing).

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents. Generous relocation allowance.

INTERVIEWS AT NCC, DALLAS

To arrange for an interview during NCC in Dallas, June 13-16, please submit resume now including salary history and experience to the Professional Placement Office at the address below.

NCR

Data Processing Division
16575 W. Bernardo Drive
San Diego, Calif. 92127

An Equal Opportunity Employer

Making Machines Do More So Man Can Do More

SPERRY UNIVAC a world leader in the computer industry, has career opportunities for individuals with experience in the areas of:

Data Base Management

(DBMS, DMS 1100, System 2000, etc.)

Transaction Oriented Systems

(IMS) TIP 1100, etc.)

Applicants should have 1-3 years systems experience. Positions are available in the middle Atlantic, New York Metropolitan and Northeast areas of the U.S.

For immediate consideration, submit your resume in strict confidence to:

SPERRY UNIVAC

Professional Employment
480 Swedesford Road
Wayne, Pennsylvania 19087
An Equal Opportunity Employer M/F

CSC
PROGRAMMER/ANALYSTS

The System Sciences Division of Computer Sciences Corporation is continuing its expansion by creating additional career growth positions for qualified computer professionals in support of two major projects.

AIR TRAFFIC CONTROL SYSTEMS

Current opportunities for key assignments exist for individuals with experience in:

Development of a real-time monitor for IBM 360 multiprocessor configuration – 6-8 years experience with a minimum of 3 years on 360; design, implementation of executive software or operating systems; ALC essential.

System generation and maintenance on OS/360 – 6-8 years experience; 360 systems generation and operating systems maintenance experience required; ALC essential.

Design and implementation of a real-time data base management system – 6-8 years experience, ALC or Jovial preferred, design, implementation or enhancement of data management or data base management systems.

Development of Software System test and validation tools – 6-8 years experience, OS/360, design and implementation of software test tools, ALC or Jovial preferred.

The design phase will require assignment in the Washington, D.C. suburban area for approximately five months and permanent assignment and relocation to Jacksonville, Florida approximately mid-September 1977.

SPACE SCIENCES

Current positions in support of our Goddard Real-Time System, Space Tracking Data Network and On/Off Site Project for the NASA Goddard Space Flight Center require a degree in Computer Science, Math, Physics, Astronomy, Meteorology or Engineering with experience using Fortran and/or Assembly languages on large-scale or mini-computers. These skills will be applied in the following concentrations:

- Telemetry application with multi-computer configuration
- Integration and testing of real-time display software
- Data base management
- Real-time scientific applicatio
- Network management
- Computer-to-computer commu..cations
- System requirements definition
- Analysis and application of climatological data
- Geometric and wave optics, lens system design and analysis, and optical system modeling

CSC offers a liberal relocation policy in addition to complete benefits package. For immediate attention, please send resume or call:

Staffing Department
Toll Free: 800--638-0842

COMPUTER SCIENCES CORPORATION

System Sciences Division
8728 Colesville Road
Silver Spring, Maryland 20910

Major Offices And Facilities Throughout The World

An equal opportunity employer

position announcements | position announcements | position announcements | buy sell swap | buy sell swap

PDP-11 Configuration System Analyst

This unusual opportunity involves the definition, programming and implementation of a new system to perform the technical editing and configuration of D.E.C.'s PDP-11 system orders.

You are most likely to excel on the project if you have experience in the development of new software systems, especially technical configuration systems, or systems requiring a knowledge of hardware and software configurations (operating systems, communications systems, hardware bill of material processing systems). Digital PDP-11 systems experience is most valuable.

If you are interested in applying, please submit your resume and salary requirements to Randy Shaw, Digital Equipment Corp., Dept. G66, 162 Main St., Maynard, Mass. 01754.

We're the company looking for people.

digital
digital equipment corporation

an equal opportunity employer m/f

EDP AUDITOR

Lge comm'l bank needs heavy systems EDP Auditor to join dynamic staff. Ideal bkgd includes programming on IBM 370 series + audit exp either from public or industry. Degree. $21,000. (Fee paid) Contact P. Siegal (In confidence)

ROBERT HALF PERSONNEL AGENCIES
1310 Liberty Bank Bldg
Buffalo, N.Y. 14202
(716) 842-0801

DEC PDP/11 EQUIPMENT

In Service and Under DEC Maintenance

Available Immediately

	DEC LIST	OUR PRICE
11/10 24K	$ 9,000	$ 7,000
RPR02 & Controller	$19,500	$17,000
2 - RK05 & Controller	$16,000	$12,000
2 - TU10 Tape & Control	$24,500	$18,000

Disk Packs Available for Above

Schenectady Service Center, Inc.
Al Keller
(518) 370-2400

PROGRAMMER

Major Midwest motor common carrier has opening in general office for programmer with a strong background in BAL to maintain and enhance an online teleprocessing package, (COBIS). IBM OS experience preferred but not required. Salary commensurate with experience and ability. Excellent fringe benefit program. Please send resume and salary history to:

GATEWAY TRANSPORTATION
Michael E. Bush
455 Park Plaza Dr.
La Crosse, WI 54601
An Equal Opportunity Employer

SUBLEASE 370/145 IH2

AVAILABLE: Packed Ready to Ship
TERM: 12 to 36 Months
RATE: 3 Yr. $11,000-Short Term Make Offer
FEATURES: 3/4 Meg (IBM), ISC, Plus More
Call Mr. Lunceford (913) 381-7272
L&A Computer Industries, Inc.
10955 Granada, Overland Park, Ks. 66211

WANTED:

A computer systems manager with background in both hardware maintenance and understanding of system and application software. Equipment: hardware configuration consists of Data General Nova 2/10. Storage system consists of control data disc drives and Xebec formatter. Operating system is educational data system "iris".

Send resume to:
Village Property Mgmt. Co.
P.O. Box 5550
Snowmass Village
Aspen, Colorado 81615
Attn: Dottie Walker

SELL • BUY
TELETYPE
Models 32-33 New, Used
Telex • TWX/DDD
BRPE'S
NATIONAL TELETYPEWRITER CORP.
207 Newtown Rd.,
Plainview, N.Y. 11803
(516) 293-0444

For sale or lease
3277's
Contact: Ted Marx (214)368-7703
SFI

PROGRAMMERS

Major Philadelphia Bank has openings in their Data Processing Department for individuals who have experience in BAL and COBOL. We have 3rd generation IBM hardware with OS-JCL. Prefer applicants with knowledge of teleprocessing and/or IMS. We will offer you a challenging extension to your career in data processing. You will have the opportunity to be a key participant in the development of advanced banking systems, utilizing the latest in hardware and software.

We have an excellent benefits package including free lunches, comprehensive medical insurance, life insurance, tuition prepayment, a substantial incentive and investment program, liberal vacation policy and paid holidays, among others.

Salaries range from $11,000 to $15,000 commensurate with experience.

If you are willing to make a commitment to a growth organization with an excellent chance for advancement, send your resume including salary history and requirements to:

PSFS

PERSONNEL DEPARTMENT
12 SOUTH 12th STREET, ROOM 740
PHILADELPHIA, PA. 19107
An Equal Opportunity Employer M/F

Programmer/Analyst

Responsible for the design and implementation of a multi-plant monitoring and communications system. Environment will be mini-computers linked to a large scale IBM System 3. Experience must include proficiency in Fortran IV and RPG II with above average communicative skills. Excellent personal and professional growth potential. Send resume with salary history to Mr. L.S. Forrester.

Dart Container Corporation
Box 151
Mason, Michigan 48854

IBM UNIT RECORD EQUIPMENT

MACH.	SALE	LEASE	MACH.	SALE	LEASE	MACH.	SALE	LEASE
024	$ 300	$20/Mo.	082	$ 850	$ 35/Mo.	514	$ 800	$ 45/Mo.
026	$ 900	$35/Mo.	083	$2000	$ 60/Mo.	519	$1000	$ 55/Mo.
029	$1900	$55/Mo.	084	$2500	$100/Mo.	526	$1400	$ 70/Mo.
046	$1200	$50/Mo.	085	$1200	$ 60/Mo.	548	$1600	$ 70/MO.
047	$1500	$60/Mo.	088	$2500	$175/Mo.	552	$1000	$ 40/Mo.
056	$ 200	$15/Mo.	089	$1300	$ 50/Mo.	557	$3000	$100/Mo.
059	$1600	$50/Mo.	402	$1000	$ 60/Mo.	602	$ 300	$ 20/Mo.
063	$ 750	$30/Mo.	403	$1200	$ 70/Mo.	1401	$10500	$400/Mo.
077	$ 450	$25/Mo.	407	$1500	$ 80/Mo.	System		

THOMAS COMPUTER CORPORATION
600 N. McClurg Court · Suite 4202
Chicago, Illinois 60611
(312) 944-1401

SENIOR SYSTEMS PROGRAMMER

Ball State University has an opening for a Senior Systems Programmer who must be able to maintain and modify DEC operating system. Knowledge of DEC MACRO, COBOL and FORTRAN compilers mandatory. Working knowledge of ALGOL, APL, BASIC and SNOBOL helpful. Starting salary commensurate with knowledge and experience. Excellent fringe benefits, 24 days paid vacation, education opportunities. Application deadline June 27, 1977. Send resume and current salary to Personnel Services Office, Ball State University, Muncie, Ind. 47306.
Equal Opportunity/ Affirmative Action Employer

WANTED

ALL 360/370 SYSTEMS AND SYSTEM/3
AND PERIPHERALS
WE BUY • SELL • LEASE • TRADE

transdata
Member Computer Dealers Association
P.O. Box 47762 Dallas, Texas 75247 PHONE (214) 631-5647

SENIOR RESEARCH PROGRAMMER

Data Processing Systems Programmer to work in computer software development for a multi-campus University Computer Center. Minimum requirements, 3 years of high level system programming.

Prospect will be employed as a senior staff member to work with new software development projects for a 370/168 - MVS. Software includes CICS/CS, IMS/VS, MODEL 204, TSO, WYLBUR, ATMS, and JESII. Advanced training will be provided. Position carries 5 weeks vacation per year. Salary open.

Starting date July 21, 1977; closing date for receipt of resumes, June 21, 1977. Send resumes to:

R. Schramm
University of Illinois
Room 370 RRB
P.O. Box 4348
Chicago, Illinois 60680

The University of Illinois is an Equal Opportunity Employer and encourages applications from women and minorities.

BUY SELL SWAP

WANTED

BURROUGHS
L's
TC's

Joan Potere
Wilson Business Machines
24293 Telegraph
Southfield, MI 48034
(313) 353-2600

PDP 11/05

Systems with Software
(General Ledger, Accounting, Payroll and Inventory Control)
28K Words of Core Memory
5 MegaByte Disk System
DL 11-E Terminal Interface
LA36 Terminal Printer

Can be configured with Multiple terminals, line printer etc. Sources and licensing included with software.

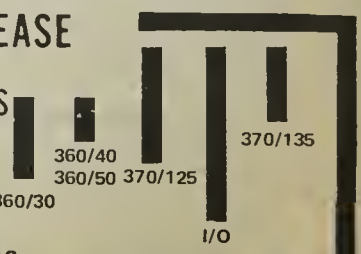
TeleData Inc.
3500 Indian School Rd., N.E.
Suite A
Albuquerque, N.M. 87106
(505) 266-5525

DEC

BROKER IN NEW
&
USED DEC COMPUTER SYSTEMS
& COMPONENTS
C.D. SMITH
730 N. Post Oak Rd. #301
Houston, TX 77024
(713) 686-9405

PURCHASE/SALE/LEASE

ALL 360 & 370 SYSTEMS



CORPORATE COMPUTERS, INC
115 Mason St., Greenwich, Conn. 06830 (203) 661-1500
Member Computer Dealers Association

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

360 FOR SALE 370

2040 H w/2
I/O SET w/UCS
2821-2 & 1403-2
2803-2, 2401-6
2821-1, 2, 6

165 K-II
(Sale or Lease)
155 J-II
ISC for 158
125 H2

WANTED TO BUY

360/65 I w/3
360/50 I w/3
1403-N1 & 2540-1
2401-5,2803-7 trk.
2314-A1-

3803, 3420's
158 - U34 or K
3830-2
3330, 3333's
145's & 135's

IPS
IPS Computer Marketing Corp.
467 Sylvan Ave
Englewood Cliffs, N J 07632
(201) 871 4200

BUY • SELL • TRADE
IBM MEMORY
360 370
All Models—IBM & Non-IBM
IBM Core Specialists
Call Dick Baker
(305) 561-5207
dataware
3000 NE 30th Place, Suite 309
Fort Lauderdale, Fla 33306
Member Computer Dealers Association

Buy Sell or Lease
IBM 360/370 Unit Record Equip.
O.A.C.
OLIVER-ALLEN CORP.
110 Hi Vista Rd.
Sausalito, CA 94965
(415) 332-6262
Member Computer Dealers Assoc.

CONTACT CSI

10 BUY SELL LEASE TRADE
Computer Equipment

Al Smith
6111 1960 West, Suite 202
Houston, Texas 77069
713-444-0246

Ken Steinback
11 S. Meramec Suite 1304
Clayton Mo 63105
314-727-7010

Bryan G. Graham
8116 Cherington Drive
Indianapolis Ind 46227
317-881-6766

Bill Roselius
901 Office Park Plaza
Oklahoma City Okla 73105
405-840-1911

CSI
COMPUTER SALES INTERNATIONAL, INC.
Member Computer Dealers Association

---

dearborn giveth: .155-JI (no dat) july; 155-J (dat) sept.; 155-J (no dat) oct.; 155-JI (dat) nov.; 3830-2 aug., sept., oct.; 3420-5 aug., sept., oct.; 3420-3 aug.; 2 ea. 2365-13 (memory w/wall frame), 1287-1 optical reader jan., 1978.

dearborn taketh away: 3540 diskette rdr.; 155's w/wo dat; 3420/3803 tapes; 135's and 145's.

Call Tom Millunchick (312) 671-4410

dearborn computer company | dealer-IBM computers systems software leasing
4849 n. scott st., schiller park, ill. 60176 (chicago) 312/671-4410
toronto (416) 621-7060 • st. louis • houston • detroit • los angeles

---

165-II

Available June, 1977
Short Term Lease (Walk-Away)

Considering the installation of a 168 on MAC as an interim machine to the 3033? Why not install a 165-II for about 50% of the cost?

TERM	MO. RATE
12 mos.	$60,000
18 mos.	57,500
24 mos.	54,000

Principals Only

CW BOX 5061
797 Washington Street
Newton, Mass. 02160

145H, 145I

S/N 10134-Avail. 7/15
S/N 10144-Avail. 8/15

FOR SALE or LEASE

Tom Robbins
Computer
Properties Inc.
7710 Computer Ave.
Minneapolis, MN 55435
(612) 831-6088

BUY-SELL TRADE
For Computer
Call Action Write
CAC
404/458-4425
P.O. Box 80572
Atlanta, Ga. 30366

Before you buy or lease . . . take a second look

TW

BUY-SELL-LEASE
360/30 — 360/40 — 360/50 — 360/65
IBM PERIPHERALS

370/135	370/145	370/155	370/165
370/138	370/148	370/158	370/168

ANY CONFIGURATION

TW COMPUTER INDUSTRIES INC.
3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654

CHICAGO — 312/298-5650
WASHINGTON — 703/525-3074
LOS ANGELES — 213/370-4844

WANT TO BUY
USED PDP-11
RSTS SYSTEM
PDP 11/35-40-45
R PO3 R PO4 DISKS
9 TRACK 800/1600 BPI
TAPE DRIVES
DH 11 MUX & CABINETS
MANAGEMENT
RESPONSE CORP.
660 Busse Hwy.
Park Ridge, IL. 60068
(312) 698-3377
IN WATS (800) 323-2135

PRINTER
IBM 1403-1100 L.P.M.
Reconditioned, Certified
for IBM MA
$19,975
F.O.B. Shipping Point
July 1, 1977 Delivery
Thomas
Computer Corp.
600 N. McClurg Court
Chicago, IL 60611
(312) 944-1401

Wanted to Buy
Used Randomex #335
Disc Pack Cleaner
in Good
Working Condition
CW Box 5058
797 Washington St.
Newton, Mass. 02160

AMERICAN USED COMPUTER CORPORATION

DEC

8I ..... 8K SPECIAL..... $1995
8L .....4K..... 995
11/10 ..... 32K W/RX11 dual floppy disk
11/40 .....40K SYSTEM
RK05 ....1.2 MEG DISK
TU56 ....DUAL DECTAPE
PR8I .....READER W/CONTROL

THOUSANDS OF UNITS IN STOCK

IN STOCK NOW

DATA GENERAL

820 8K to 32K PRICES START AT **$2800**

NOVA 2/10.....32K.....$5950
ULTIMACC 11 SYSTEM....$3500

ALSO MINIS FROM CAI, GRI, RAYTHEON SEL, VARIAN, CASCADE AND LOCKHEED

617-261-1100 Member Computer Dealers Association
PO Box 68, Kenmore Station, Boston, MA 02215

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

MINI COMPUTERS FOR SALE

D.E.C. CPU's
11/04, 11/05, 11/34, 11/35, 11/45
D.E.C. Disks
RK05, RP03, RF11-RS11, RX11BA

D.E.C. CRT'S
VT50HA, VT05, VT52

Printers,
D.E.C. LS11, Data Products 2410, Centronics 101, Data Printer V132C.

Call for other components in stock.

DATALEASE
(714) 533-3920
700 No. Valley St., A
Anaheim, CA 92801
Tlx. 692439 DATALEASE ANH

FOR SALE

HONEYWELL 2020 SYSTEM
AVAILABLE JULY 1977

- 32K CPU
- Reader/Punch 400CPM
- Printer 132 pos, 450 lpm
- 3 tape drives 7TR, 556BPI, 20KB
- 2 disk drives 9.2MB

SCRIPPS-HOWARD NEWSPAPERS
1100 Central Trust Tower
Cincinnati, Ohio 45202
Call or write:
Dan Castellini
(513) 621-0130

WANTED

IBM 2401-3 Tapes w/2804
IBM 2314-1 Disk
360/40 G to H core (any)
2nd Sel Chnl for 360/30
Floating Point for 360/40
IBM 1403-N1 Printer w/UCS

GENE

713-629-4400

CONTINENTAL Information Systems

BUY, SELL, LEASE, SUBLEASE, AND TRADE

New and Pre-owned IBM Equipment

165 & 168
Fred Hughes
Charlie Berry

155 & 158
John Delaney
Fred Cholette
Jim Hanly

Peripherals
Gene Chappell

Up-State New York
Dick Whalen

Other
Bill Pomeroy

BUY
138, 148, 158, 168

SELL
135 GD, 158, 168

LEASE
135H, 155II, 165-II

SUBLEASE
135, 158

OTHER
1403-2, B1714, HP-3000
Memorex 1270

Government
Dean McGaan
Eric Will

115-148
Lou Skavienski
Jim Hartnett
Al Gillis

360
John Humic

System/3
John Bartolo

Features
Chuck Schmitt

CIS
CIS Corp.
600 MONY Plaza
Syracus , NY 13202
315-425-1900 Telex 93-7435

UPGRADE

LET US HELP YOU
UPGRADE
PRESENT DEC SYSTEM
11/34, 35, 40
TO THE LATE
DEC 11/60, 11/70
SYSTEMS
TRADE-INS ACCEPTED

Call or WRite
JOHN J. FOGARTY

IOA DATA CORP.
383 LAFAYETTE ST., N.Y. 10003
212 673-9300

U P S FOR SALE

50 KW unit, 1/2 hour batteries 140 cells PSC Inc., Unit-installed 1974 Serviced quarterly. Includes remote panel, step down trans., some spare parts.
Available July 1, 1977
Contact J. James
EDGCOMB METALS
Andalusia, PA
(215) 639-4000 Ext. 356

FOR SALE
Hewlett-Packard 2000 E
(21 MX Version)
Age: 16 months
well maintained
Contact:
Mountain Time Sharing
Box 761
Billings, Mont. 59103
(406) 252-4934

Need **370/138** or **148** Order Position?
PCM has delivery Positions
on 370/138's and 370/148's
starting in July '77 through January '78.
Call Ralph Graves 214/630-6700

PCM
Pioneer Computer Marketing
1165 Empire Central Place
Suite 232
Dallas, Texas 75247

MINICOMPUTERS
Don't waste company money. Check with us before you buy or sell.
DEC, DGC, Most Others' systems and peripherals.
DEC — COS 340/save 25%. PDP 11/10 with floppy discs/save 25%. PDP 11, PDP 8, DEC peripherals.
DGC — NOVA 800 Timeshare System/save 50%. Tape systems/ from $3900. RJE Terminals. Nova 2, Nova 3, Eclipse.
WANTED
Minicomputer systems and peripherals . Buyers waiting for many items:
DEC RK 05
PDP 8E, 11/05

MINICOMPUTER EXCHANGE

(408) 733-4400
TWX 910-339-9272

Wanted To Buy

3672-Memorex storage control unit
3673-Memorex disc controller
3670-Memorex disc module
3675-Memorex disc module

Contact:
Harry Blair 713-524-1401

BUY SELL LEASE
SYSTEM/3

Models 8, 10, 15
1403, 5421, 5445
3741, 5496, 9610

COMPUTER BROKERS, INC.
P.O. BOX 28298
Memphis, Tn. 38128
Phone 901/372-2622

FOR SALE

NEW DEC EQUIPMENT

- RPR11-AA 20 M Byte Drive & Controller
- RP04-AA 88 Mbyte Drive
- RK06-EA 14 Mbyte Disk Drives (2)

IMMEDIATE AVAILABILITY

BROOKVALE ASSOCIATES
(516) 585-0800

FOR LEASE

370/148-J Avail July
370/138-J Avail June
370/145-IH Avail Now

COMMUNICATION ASSOCIATES, INC.
5800 E. Skelly Dr.
Tulsa, OK 74135
(918) 627-6024
TLX 497420

END USER WANTS

TO BUY:
3155J with DAT, no memory
For Labor Dav Installation

TO SELL:
370/148 on-order position
July 22, 1977

CW Box 5066
797 Washington St.
Newton, Mass. 02160

BUY/SELL/LEASE/TRADE

IBM 360s, 370s, System 3s, all Peripherals
3830s, 3333s, 3330s, 3420s, 3803s

Purchase/Leaseback Machines Wanted
All types 1400 Series; 1130s
Unit Record Equipment Refurbished
— All Models

MEMBER CDA

Call collect today (214) 634-2750

METROPLEX COMPUTER COMPANY, INC.
Suite 1208 Honeywell Bldg. 1111 W. Mockingbird Lane
Dallas, Texas 75247 TWX 910-861-4171

Industry's Fastest Growing Computer Dealer

Available for 24 month lease or purchase

768K Cambridge 370/145 Memory

Make Offer
Contact Gary Cooper
(714) 821-2276

BUY — SELL — LEASE — BROKERAGE
Let the
"NATIONS LARGEST WHOLESALE DEALER"
Buy, sell, lease, sub-lease, or be your agent in placement of your pre-owned IBM 360/370/System 3, or other units
COMPUTER INTERNATIONAL, LTD.
CWC's international division —
experts in foreign markets, freight, customs
BEACH COMPUTER CORPORATION, CWC's Leasing Division
COMPUTER WHOLESALE CORP., (504) 581-7741
SUITE 507/508 FIRST NATIONAL BANK OF COMMERCE BLDG.
NEW ORLEANS, LOUISIANA 70112
MEMBER OF COMPUTER DEALERS ASSOCIATION

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

The Logical Choice

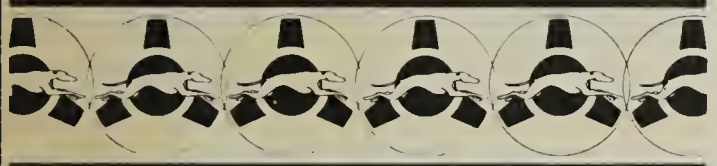
SELLING 360/65 ½ Meg July 15
370/155 with DAT July 15
370/165 with DAT NOW
370/145 256K NOW

LEASING 360/65 ½ Meg 24 months
370/145 256K 12 months
370/155 with DAT 24 months
370/165 3 Meg DAT 24 months

BUYING 370/158 370/168 370/145
3420 Tapes 3830, 3333

COMDISCO
9701 W. Higgins Rd. Rosemont, Ill. 60018
(312)698-3000
San Francisco (415) 944-1111
New Jersey (201) 568-9666

GO GREYHOUND



WHEN BUYING OR SELLING COMPUTER EQUIPMENT

For Sale	Want to Buy
370/145 H2	IBM 3803-1 and
360/50 H	8 3420-7's

U.S.	Home Office	T.A. Takash	(602) 248-6037
	New York	Dick Ventola	(914) 949-1515
	Chicago	Pete Ahern	(312) 298-3910
	Dallas	M.W. "Bill" Tucker	(214) 233-1818
	San Francisco	Henry Paulson	(415) 283-8980
International	Canada	Don Maunder (Toronto)	(416) 366-1513
	U.K./Europe	Joe Gold (Geneva)	(022) 61-27-54
	Mexico	Andres Contreras	(905) 543-6850
	Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
	Eurasia	Don Haworth (Dallas)	(214) 233-1818
Non-IBM	Dallas	John Hallmark	(214) 233-1818

Greyhound Computer Corporation Greyhound Tower Phoenix, Arizona 85077

SELLING

PREVIOUSLY OWNED EQUIPMENT

FRIDEN • I B M • LITTON • PHILIPS • OLIVETTI

N.C.R. 31, 32 & 41, 42, 43 450's & 480's Bank Equip
735/736 MAGNETIC TAPE ENCODERS & LINE PRINTERS
299 and 399 Minicomputers and Centurys
BURROUGHS F-5000/6000/9000 SERIES & "L" 2000 THRU 8000 SERIES & TC's (W/WO PERIPHERALS) also B-700 SYSTEMS THRU B-4700
N.C.R. Authorized Dealer of
210 Electronic Cash Register, Adding Machines, Calculators

BUYING OR SELLING — CALL US FIRST!

KEY-EXIMPORT CORP.

256 LIVINGSTON ST. (P O BOX 129) NORTHVALE, N J 07647
TELE. N.J. (201) 767-3444 N.Y.C. (212) 736-7736
TELEX 135149 CABLE KEYEXIMP NORTHVALE NJ

BUYING

THERE ARE MANY ALTERNATIVES TO THE IBM 138-148-158-168

LEASE PLANS

AND WE OFFER THEM ALL

We Also Lease All Other 370 Equipment.
Will Purchase Your On Order Position!!!

National Computer Rental
415 Madison Avenue
New York, New York 10017
Tel. No. (212)532-1500

PDP 11 DATASYSTEM 324

PDP 11/03, 56K
2-RK-5's
1-VT52 Terminal
1-LA180 Printer
with integrated accounting Applications for A/P, A/R, Payroll and G/L
$44,500
or
with Accountant's Client Write-up software
$39,000

JUNE DELIVERY
SPIRIDELLIS & ASSOCIATES, INC.
14 W. 40th St., N.Y.C., N.Y. 10018
(212) 221-7270 (201) 536-2104

125 FOR SALE

HG2(384K) ICA, IPA
Available
Early July
Tom Robbins
Computer Properties Inc.
7710 Computer Ave.
Minneapolis, MN 55435
(612) 831-6088

FOR SALE
360/65 CORE

EM&M: ½ & 1 Megabyte
IBM: 2305's
FABRI-TEK: 1&2 Megabytes

Call Dick Baker
(305) 561-5207

dataware
3000 NE 30th Place, Suite 309
Fort Lauderdale, Fla 33306
Member Computer Dealers Association

FOR SALE
BURROUGHS B3500

120 KB Core Memory
800 lpm Line Printer
(2) 800 BPI-9-Tr Tapes
800 CPM Card Reader
20M Bytes Disk (20 ms)
Ernie Lucken
Diversified Computer Applications
2525 E. Bayshore Road
Palo Alto, Calif. 94303
(415) 324-2523

FORSYTHE McARTHUR

Dealer & Lessor in IBM Computers

919 North Michigan Avenue
Chicago, Illinois 60611
(312) 943-3770
Member, Computer Dealers Assoc.

CALL FOR BIDS

Sealed Proposals to Sell

1. Nov. "Delivery Position" IBM 370/148 J with 3047 power unit and 3705 communications control unit
2. Sixteen IBM 3277 CRTs with two IBM controllers (3271 and 3272)

will be received at the office of the Purchasing and Stores Supr.
Public Utilities Building
3628 South 35th Street
P.O. Box 11007
Tacoma, Wash. 98422

BIDS WILL BE RECEIVED UNTIL: 3:00 p.m., Friday, June 24, 1977 at which time they will be opened.

A 10% bid bond or cashiers check to the City of Tacoma must accompany each bid.

Specification and proposal forms can be obtained by interested bidders at the aforementioned address or by phoning (206) 383-2741, Extension 207.

The City reserves the right to reject any and/or all bids, waive technicalities or irregularities and to accept any bid it determines to be in the City's best interest.

RCM

BUYING
SELLING
LEASING

360/40	370/145	370/135
360/50	370/158	370/155
360/65	370/168	370/165

TAPES / DISKS / CORE

Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247
214/630-6700

Lease your 370 from Randolph.

370/135
370/145
370/138
370/148

...and all other 370's from 115's...to 168's. CPU's or full systems.

CALL the Randolph 370 Hotline...
800-243-5307

WANTED:
3340 Disks: A2's, B2's
3420 Tapes: MOD 3's, 5's, 7's
138/148 on-order positions
135/145 Subleases or outright purchase

Call 800-243-5308

Randolph Computer Co.
537 Steamboat Rd., Greenwich, CT 06830
(203) 661-4200

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

HELP!

Sales are going so well that we need to

BUY COMPUTERS & PERIPHERALS

ANY MAKE - ANY QUANTITY

CASH AVAILABLE!

CALL AL NEWMAN NOW!!

NEWMAN COMPUTER EXCHANGE
1250 N. Main St. Ann Arbor, Mi. 48104
(313) 994-3200

CMI BUY LINES

BUY-SELL-LEASE-TRADE

370 115/125/135
Call Pam Hoban
(313) 642-8000

360/20 1130
Call Jim Carleton
(313) 642-8000

360/30 360/40
Call Gary Smith
(313) 642-8000

360/50 360/65
Call Bob VanHellemont
(313) 642-8000

370/145
Call Ron Baker
(313) 642-8000

1403's 2821's 2501's 1442's 1443's
If you rent any of the above and are sending back to IBM call me. I'll show you how to make money using your rental credits. We also buy owned equipment and sell all of these units.
Call Kathy Housey
(313) 642-8000

IN CANADA IBM 360 370
System / 3
Buy-Sell-Lease
Call Don DuPuis
CMI Company
P.O. Box 893
Windsor, Ont.
N9A 6P2
(519) 258-8910

370/155-158
Call John Mills
(313) 642-8000

3270 CRT's
Printers/Controllers
Call Jim Carleton
(313) 642-8000
129-029-059-026

System/3
Model 15
Call Jerry Roberts
(313) 642-8000

3420/s 3803/s 3333's 3830's 3330's 3340's
Call Darryl Hastings
(313) 642-8000

CMI The IBM Dealer
Computer Marketers International
1500 N Woodward Ave., Birmingham, Mich. 48011, (313) 642-8000
Member Computer Dealers Association

IBM UNIT RECORD EQUIPMENT

024 077 085 402 514 552 026
082 087 403 519 557 029 083
088 407 523 602 056 084 089
408 548 604 029 129

We Buy Sell or Lease
360s 1400s 1440s

IBM COMPUTERS

2040 GF, I/O Set
5 Spindle Calcomp 2314
6-60KB Tape Drives/Sims
8-1440 Disc Systems at $4,000
16K 1460 Systems with 1403-3
2803-2 and 2401-6
1401 Disc Systems
360/30's & 40's
any configuration

Big Savings on certain items of Equipment

Call us for all your needs; we buy rent and sell all types of IBM unit record equipment. Over 12 years of serving commercial and government requirements. Contact ACS for proposal.

ACS 7126 Mullins
Houston TX 77036
(713) 666-2122
TWX 910-881-1526

EQUIPMENT CORP.

WANTED

BURROUGHS
L Series - TC700 -- TC 3500
B731-B1700

NCR
299 - 399 - 499
270 - 775 - 152

IBM
360-370; Syst 3 & 32 Peripherals

DEC
PDP 8 And 11 CPU's
Peripherals

IOA DATA CORP.
383 LAFAYETTE ST., N.Y. 10003
(212) 673-9300

DEC

FOR SALE
PARITY CORE
MF11-LP 8KW
MM11-LP 8KW
MF11-UR 32 KW
ALSO
PDP-11/45 RS/RF11
AMCOR
(502) 491-9820

FOR SALE

2314-type disks
Available Now
Price $7,000
Mohawk 1 x 4 system
Controller & four spindles
Contact Tom Dowling
States Steamship Company
320 California St.
San Francisco, CA 94104
(415) 982-6221

FOR SALE

IBM 3704
COMMUNICATIONS CONTROLLER
AVAIL SEPT 1
$22,500
C.W. MCKELLAR
(401)886-2220

BUY • SELL • LEASE • TRADE

SYSTEM/3 370/115 370/125
(ALL MODELS) 360/20 1130

ECONOCOM
1255 LYNNFIELD ROAD
P. O. BOX 17825
MEMPHIS, TENNESSEE 38117
901-767-9130
MEMBER COMPUTER DEALERS ASSOCIATION

FOR SALE

NEW DEC EQUIPMENT
- PDP11/34-LM 32K Words MOS/ DL11-W
- H960-CA Cabinet
- RPR11-AA 20 Mbyte Disk Drive & Controller
- RPR02-AM 20 Mbyte Disk Drive

IMMEDIATE AVAILABILITY
BROOKVALE ASSOCIATES
(516) 585-0800

dataserv

buy • sell • lease • trade

360	370	System/3	Peripherals
360/30	370/115	5410	Disks
360/40	370/125	5415	Tapes
360/50	370/135	Sys/32	Printers
360/65	370/145+	Peripherals	Card I/O

Call our "quotation hot-line"
Toll free **800/328-2406** / or 612/544-0335
Or write: Dataserv Equipment, Inc., 9901 Wayzata Blvd., P.O. Box 9488, Minneapolis MN 55440

BUY
SELL
LEASE
Peripherals & I/O

3330's	3410's	3211's
3340's	3420's	3505's
3350's	2401's	1403's
2314's		2501's

Gene Chappell
CIS
CIS Corp.
600 Mony Plaza
Syracuse NY 13202
(315) 425-1900
Telex: 93-7435

FOR SALE

4/026 IBM
KEYPUNCH MACHINES
Approved for IBM Maintenance
Best Reasonable Offer
Priced to Sell
P.S.P. Inc.
P.O. Box 2
Segreganset, Mass. 02773
TEL. (617) 669-6701

BUY or ASSUME LEASE

Three PDP 11/70 (D.E.C.)
Available: 1 - June, 1 - August, 1 - October
Call: Daniel T. Robinson
(213) 879-4991

buy sell swap | buy sell swap | buy sell swap | software for sale | software for sale

FOR SALE
IBM System 3 Model 10

TYPE	MODEL/FEATURE	QUANTITY
5410	A14	1
	3971	1
	4100	1
5203	002	1
5424	A02	1
5444	002	1
5496	002	4

Available June 10
Currently under IBM maintenance agreement
CW Box 4989
797 Washington St.
Newton, Mass. 02160

FOR LEASE AT 49% OF IBM TLP/ETP
3145-102 WITH: 4660. 6982. 6983, 8810, 7855, 3047-1, 3215
(1) 2821-1 (1) 2540 (1) 1403-N1 (1) 3333-11 (2) 3330-11 (1) 3803-1 (4) 3420-5
48 Month Lease - $15,101
NET, NET, NET
Early Termination Privileges Available
MACHINE AVAILABLE AUGUST 1
SYSTEMS MARKETING, INC.
200 East Thomas Road
Phoenix, Arizona 85012
(602) 264-5444 Telex 667-334

360/50 CORE
FOR SALE - AVAILABLE NOW

IBM:	All Sizes. G/H, H/HG, H/I, HG/I, etc.
FABRI-TEK:	Upgrades to 1 Megabyte
SMI:	Upgrades to 2 Megabytes
	Compact 23" square desk-hi cabinets

Specialists in IBM Core. Trades & Leases Considered
CALL DICK BAKER (305) 561-5207
dataware incorporated
Intracoastal Building
3000 NE 30th Place, Suite 309
Fort Lauderdale, Florida 33306
Telephone (305) 561-5207
MEMBER CDA

Limited Offer!
NEW 200 LPM
TALLY
Series 2000
Line Printers
Immediate Delivery
$3625
Minicomputer Interfaces Available
Call Fred Crowley
(800) 243-9054

SALE
DECprinter I Model LA 180
HIGH SPEED PRINTER
$2,850.00 ea.
Complete with EIA Serial I/O interface
$2,500.00 ea.
You provide interface
Full DEC Warranty
Terms:
Two weeks ARO
F.O.B. Park Ridge, Ill.
CASH WITH ORDER
Also available: LA 36, LS 120, VT 52, 1103, Diablo 1620, Cassette & Floppy systems, TI 745, TWX/DDD Alternates, TTY-43 & Couplers.
MANAGEMENT RESPONSE CORP.
660 Busse Hwy.
Park Ridge, IL. 60068
(312) 698-3377
IN WATS (800) 323-2135

For Sale or Lease
Configurated to your needs
System 3/15
A 19 June Delivery
B 18 Immediate Delivery
B 19 Immediate Delivery
C 21 May Delivery
D 21 May Delivery
C 24 August Delivery
D 24 August Delivery
3340.A2 Disk May/August
3742.1 Work Stations Immediate
1403.2 or N1 Printers Immediate
3741.1 Work Station June Delivery
3411.1 Tape June Delivery
3410.1 Tape June Delivery
Call Avery Reynolds 214-630-6700
Pioneer Computer Marketing
1165 Empire Central Place
Suite 232
Dallas, Texas 75247

370/135 (240K)
$3,200/MONTH
Seeking a 5-Year Sublease; will consider shorter periods.
Flexible Terms. Extras.
Features:
3670, 4650, 4670, 6981, 7855, 7861, 8637.
3215 Console
3046 Power Unit
Available Immediately.
Contact Larry Gunther
ARTHUR D. LITTLE, INC.
(617) 864-5770

WANTED TO BUY
Hewlett Packard 9830A Calculator, 4K Word Memory, Preferred. Also, Matrix ROM, Strings ROM, Mass Memory ROM, and 9866A or 9871A Printer.
WRITE:
CONSOLIDATED PAPERS, INC.
P.O. Box 50
Wisconsin Rapids, WI 54494
ATT: Purchasing Dept.

FOR SALE
UNIVAC 1004/1050-III

Type/Model	Description
2010-01	1004-I-01 Card reader
FO624-00	Converion Kit
2009-00	Card Punch
0500-06	1050 Processor
FO635-00	1004 Adapter
FO593-00	Core Memory (32K)
5002-03	Fastrand Control
6010-00	Fastrand II
FO688-02	Fastbands
5307-00	Uniservo VIC Cntl
0858-16	Uniservo VIC Master
0858-01	Uniservo VIC Slave
4002-01	Central Site Console
FO701-00	Inquiry Typewriter AC

Call or write:
D.P. Manager
Mutual Wholesale Drug Company
P.O. Box 2988
Portland, Oregon 97208
(503) 226-7741

FOR SALE/LEASE
DEC
LA 36 DECwriters (New)
VT52 DECscopes (New)
LA180 DECwriters (New)
+ Many DEC type interfaces, controllers
RK05's, RP02's, RP03's
+ minicomputers, Peripherals, Systems Memories
WANTED
PDP8E's, PDP 11/05's, PDP 11/35's
Contact: Ted Rays or Frank Zimmer
UNITRONIX CORP.
1081 U.S. Hwy 22
P.O. Box 6515
Bridgewater, N.J. 08807
(201) 725-2560

Blue Cross and Blue Shield of Iowa has the following for sale:
2-Anton-Piller Motor Generators with parallels and sound-proofing baffle for use with an IBM 370/168 or 3033 Computers.
Units are new (never uncrated) and would have full warranty.
Please phone or write
Ronald W. Hobbs
Purchasing Manager
(515) 245-4550
636 Grand, Sta. 29
Des Moines, Iowa 50307

REAL-TIME MINI-SYSTEMS FOR SALE
* Dual Processors
* 300 LPM Printer/4 Disk Drives
* 2 Matrix Printers/10 CRTs
* Software: Real-Time Disk OS Fortran/Macro Assembler

Complete System will be sacrificed to the highest bidder. Send inquiries to:
"COMPUTER"
P.O. Box 6100E
Miami, Fl. 33161

SOFTWARE FOR SALE

HOSPITAL SOFTWARE PACKAGES
Installed and operational in major hospitals nationally. Written in ANSI-COBOL. Perpetual lease. IBM 360-370/OS/DOS, Burroughs, Honeywell, Univac, NCR. Fully documented with source code.
- Budget Performance
- General Ledger
- Cost Allocation
- Financial Statements
- Report Generator
- Accounts Payable
- Payroll
- Personnel Management
- Inventory Control
- Patient Billing/Accounts Receivable

HOSPITAL FINANCIAL SERVICES, INC.
170 Newport Center Drive
Suite 240
Newport Beach, Calif. 92660
(714) 759-0223

Check out the best payroll system on the market today
PAYCER
- Multiple Company System
- Presently in 80 sites serving 1500 customers
- Labor distribution subsystem
- Error-free performance

Write or call for complete information on PAYCER, plus all our other systems.
Florida Software Services
P.O. Box 2269 Orlando, Fla. 32802
(305) 831-3001

PDP 11
Software for Sale
A/R
A/P
G/L
PAYROLL
Written in DIBOL
EXCELLENT USER DOCUMENTATION
will sell with or without hardware
SPIRIDELLIS & ASSOCIATES, INC.
14 W. 40th St., N.Y.C., N.Y.
(212) 221-7270 (201) 536-2165

ACCOUNTING SOFTWARE FOR DEC RSTS/E CTS-500 USERS
From one of the pioneers in commercial data processing using RSTS. Successful installations in manufacturing, distribution, service bureau uses. Completely on-line, interactive systems. If you are installing or have installed a RSTS/E or CTS-500 system, contact us first for cost-effective solutions in: ACCOUNTS PAYABLE; GENERAL LEDGER; FINANCIAL REPORTING

The design specifications for these packages were developed by accountants for use by accountants. All packages provide excellent audit-trail, extensive user prompting, fast data entry, full file-maintenance and inquiry capabilities, modular design and construction.
These are consolidating packages and support multi-division company and multi-company corporate accounting functions.
For more information, contact us at:

(219) 936-2183
p.o. Box 160
plymouth, in 46563
Div. of Young Door Co.

Plycom tm services

RSTS/E
DATA BASE MANAGEMENT SYSTEM
- Only true index sequental access method
- Written in basic plus
- Easy to use
- Handles over 8,000,000 records per file
- Handles all CODASYL relationships
- Increases usable application program space
- First data base available designed to take advantage of the features of RSTS6B

Bloodstock Computer Services, Inc.
P.O. Box 4097, Lexington, Kentucky 40504 (606) 278-0411

PDP 11 SOFTWARE

RT Client Write-Up	$4,000
RSTS SYSTEMS	
General Ledger w/integrated A/R & A/P	$5,000
Payroll/Personnel	$3,500
Retail Inventory	$3,500
Industrial Inv.	$7,000
Project Monitoring	$1,250
Project Cost Anal.	$1,250
Purchase Order Sys.	$1,000
PERT/CPM System	$1,000
Mailing List PGM	$500

Attractive Multiple License Pricing May Be Arranged
TeleData Inc.
3500 Indian School Rd., N.E.
Suite A
Albuquerque, N.M. 87106
(505) 266-5525

FREE SOFTWARE
Why pay thousands of dollars for Payroll, Billing, Inventory, or Accounts Receivable software. Unlike other software cos. we don't believe in making all our profit off you! We have compiled a Library of Money making, Money saving! Advanced Business programs, all written in a language your computer will comprehend, BASIC. We also offer Games Eng, Stat, etc. For a little more than the price of the paper you could own tens of thousands of $$$ worth of powerful software. Vol. III Ad. Bus.-$39.95. While they last. Add $2 for hndl. plus postage. (Includes: A/R, Inventory, Payroll, etc. software) CASH/CK/MO/MC/BAC * S.R.I. 1712C Farmington Ct., Crofton, MD 21114.

TONE 3
The only COMPLETE time sharing system for VSI
(check these points)
- Edit with full screen capability
- Internal reader job submit
- Output retrieval with remote support
- System maintenance
- Program development
- Data entry
- System debugging
- Text editting
- Performance monitoring support
- User command interface
- Interactive program execution
- Operations addditional console support
- Dataset maintenance
- Catalog management
- Isp support
- Remote entry subsystem support
- Enhanced 3270 usability
- Full ASCII terminal support
- Interactive computing
- Data inquiry

TONE Software Corp.
write for details
(714) 636-8501
11588 Trask Avenue
Garden Grove, Ca 92643

software for sale	software for sale	software for sale	software for sale	time & services

Computer Typesetting

Gain a variety of typesetting options with a new time- and dollar-saving tape from NTIS. Two files present tables for generating alphabetic and graphic characters on COM devices, on digital plotters, or on all devices capable of plotting vectors of arbitrary length and direction. Produces 1377 English characters and hundreds more in Katakana, Hiragana, and Kanji. Developed by the National Bureau of Standards.

Order *A Contribution to Computer Typesetting* today—PB-263 926/CPH for 7-track BCD and PB-263 925/CPH for 9-track ASCII $250 ($500 outside North American continent).

NTIS
National Technical Information Service
U.S. DEPARTMENT OF COMMERCE
5285 Port Royal Road
Springfield, Va. 22161

For more information on this and other computer products, contact Computer Products Office at (703) 557-4763 or write to the above address.

InSci

Information Science Incorporated
Others may claim conversion, training and installation, but we really do it

Personnel

Every company with 500 employees or more should look at this system

InSci 95 Chestnut Ridge Road Montvale NJ 07645 201 391 1600

SOFTWARE WANTED

Datacenter 370/158

3 meg VS2
Specializing in
Remote Job Entry
and Batch
Excellent Technical Support
Very Attractive Rates
Contact: Stu Kerievsky
(212) 564-3030
Datamor
132 W. 31st St.
New York, N.Y. 10001

WANTED:
8080 SOFTWARE

Microcomputer manufacturer wants to purchase DOS, Extended BASIC, RPG, FORTRAN IV, COBOL, APL, SORT/MERGE, DBMS and other system development software. Respond with specs, operational status, hardware required, preferred method of sale.

CW Box 4763
797 Washington St.
Newton, Mass. 02160

Thomas National, Inc

1775 Broadway, N.Y.C.

370/158 TIME SALES

All Major Systems Supported

High Speed Low Speed RJE
Convenient 57th St. Location
Open 24 Hours Everyday
Call (212) 765-8500

BANK SYSTEMS

Central Information
Financial Control System
Mortgage Loan
Time Certificates of Deposit
Commercial Loan
Demand Deposit
Installment Loan
Savings

COMDAR
CORPORATION
892 Worcester St.
Wellesley , Mass 02181
(617) 237-5585
Offices: Boston/Los Angeles

TIME & SERVICES

CHEAP TIMESHARING IN BOSTON

RSTS/E BASIC-PLUS

$3/connect-hr is all you pay. No other charges. First 250,000 bytes storage free.

Software you can use includes: accounting (p/r, a/p, a/r, g/l), word processing, database management, mathematical and statistical packages, and dozens of games.

Also: proprietary cross-assemblers for: 8080, 4040, 6500, 6800, 9900, F8.

Limited accounts available, so call me today. Joe Schachter, Random Research, Inc., 41 Amory St., Cambridge, MA. 02139.

(617) 492-2765

Computer Time Brokers & Specialists

- On-site or remote processing under OS, DOS, VS, VM.
- Installations throughout the New York metropolitan area.
- Work space at all facilities.

BROOKE COMPUTER CORP.
250 W. 57 ST., NEW YORK, NY 10019
212/586-0923

General Ledger

In 1976 MSA'S General Ledger/ FICS System helped our clients keep track of more money than The U.S. Mint printed in the last 15 years.

If you'd like to find out how this system can help you in asset management, profit planning, cost and general accounting, call Marge Kimbrough at (404) 262-2376 or send us this coupon.

MSA
THE FINANCIAL SOFTWARE COMPANY

Management Science America, Inc.
3445 Peachtree Road, N.E.
Suite 1300
Atlanta, Georgia 30326
(404) 262-2376

Chicago 312-986-2450;
Los Angeles 213-822-9766;
New York 201-871-4700

NAME
COMPANY
TITLE
ADDRESS
CITY
STATE ZIP
PHONE COMPUTER MODEL

I am interested in:
- ☐ General Ledger
- ☐ Personnel Management and Reporting
- ☐ Payroll Accounting
- ☐ ALLTAX™
- ☐ Supplies Inventory Control and Purchasing
- ☐ Accounts Receivable
- ☐ Accounts Payable
- ☐ Financial Information and Control
- ☐ Fixed Asset/Property Accounting

RPG II SYSTEMS

*A/R-OPEN ITEM OR B/F
*ACCOUNTS PAYABLE
*GENERAL LEDGER
*PAYROLL AND LABOR DIST.
*INVENTORY
*CREDIT UNION' MAILING, ETC

Extensive Documentation Provided
Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, LA. 71291
(318) 388-2236

TURNKEY SYSTEMS

LSI- MICRO RAD
COBOL / ANS 74
TURNKEY SALES
DEALERS WANTED
* medical billing
* hotel-motel-hosp
* custom A/R
micro/peripherals
crt-quad floppy
12 meg 24 meg disks
mag tape printers
contact

P.A.I., INC.

7404 Deep Run
Birmingham, MI 48010
(313) 645-1772

the choice of
Mass Merchandisers

ACCOUNTING IV® GENERAL LEDGER

Our software packages—General Ledger, Accounts Receivable, Accounts Payable, and Standard Cost—are the choice of leaders like Mass Merchandisers . . *not by chance, but by design.*
For details, call (201) 488•2100

informatics inc
World's Largest in Software Proocucts
65 Route 4. River Edge. N J. 07661

GCS

PAYROLL/PERSONNEL

Data Base System
Structured Design
Structured Programming
On Line:
Inquiry
Maintenance
New Employees
Pay Offs
Time Reporting
Any Field Query
Any Field Display

write or call
General Computer Services
P.O. Box 5148
Huntsville, AL. 35805
(205) 539-9492

WE ARE
BROKERS OF COMPUTER TIME
New York & New Jersey Only
Computer Reserves, Inc.
(212) 687-1840
(201) 676-1881

To meet (or beat) deadlines, to handle user requests, to stay within budget, use

PC•70

The automated system that helps you manage people and projects effectively, PC-70 is applicable to virtually any type of project or project-oriented group, including DP, engineering, R&D, legal, facilities planning, maintenance, and construction. Simple, powerful and economical, PC-70 is today's leading project/resource management system, with over 300 clients worldwide.

Atlantic Software Inc.
5th & Chestnut Sts.
Philadelphia, PA 19106 / (215) 922-7500
Europe: Tecsi Software, Paris / 225-86-83

To build cost-justified information systems that satisfy user requirements, use

SDM•70

The practical, top-down approach to creating information systems, SDM-70 provides a complete set of guidelines (planning, estimating, methods, and documentation) to perform the entire systems life-cycle process . . . simply and effectively. Best of all, SDM-70 costs $1,000's less than other alternatives.

Atlantic Software Inc.
5th & Chestnut Sts.,
Philadelphia, PA 19106
(215) 922-7500

Whether you're buying, selling, swapping, hiring or looking, Computerworld's Classifieds work.

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Turnkey Systems and Real Estate.)

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy.

Cost: Our rates are $49.70 per column inch. Minimum size is two column inches and costs $99.40 per insertion. Extra space is available in half-inch increments and costs $24.85. Box numbers are $1.00 extra.

Billing: If you're a first-time advertiser, we must have your payment in advance.

Ad Size: _____ Issue (Date(s): _____ Section: _____

Signature _____

Name: _____

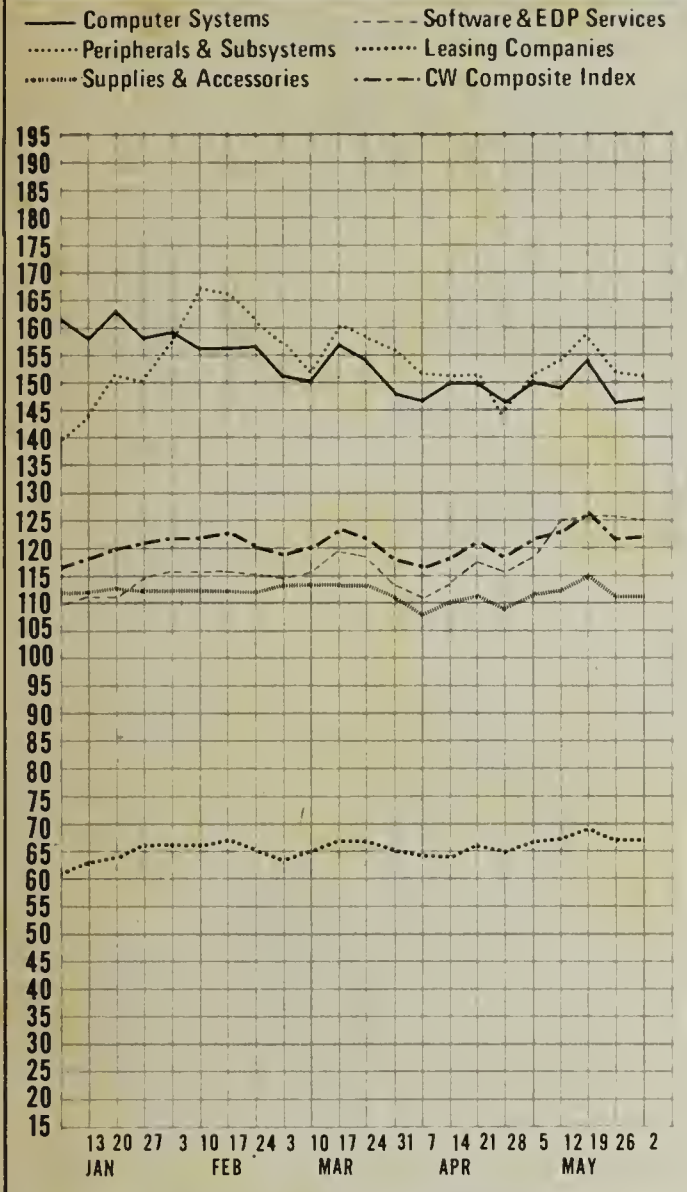
Company: _____ Title: _____

Address: _____ Tel: _____

Send this form to: Kathy Steinberg, Position Announcements or Frank Collins, Classified Advertising

COMPUTERWORLD, 797 Washington St., Newton, Mass. 02160

COMPUTERWORLD Computer Stocks Trading Indexes



Earnings Reports

COMPUGRAPHIC
Three Months Ended April 2

	1977	1976
Shr Ernd	1.0	$.9$
Revenue	31,786,000	22,$90,000
Earnings	2,421,000	1,840,000
6 Mo Shr	2.04	1.79
Revenue	60,948,000	44,226,000
Earnings	4,6$7,000	3,441,000

FOUR-PHASE SYSTEMS
Three Months Ended Merch 31

	1977	1976
Shr Ernd	$.60	$1.36
Revenue	18,798,000	14,690,000
Tax Cred	735,000	619,000
Earnings	2,334,000	1,496,000

MOTOROLA
Three Months Ended Merch 31

	1977	1976
Shr Ernd	$.80	$.60
Revenue	409,861,000	346,996,000
Earnings	22,810,000	16,898,000

NATIONAL CSS
Yeer Ended Feb. 28

	1977	1976
Shr Ernd	$2.81	1.9
Revenue	41,703,000	3$,603,000
Earnings	3,222,000	2,161,000
3 Mo Shr	.73	.$4
Revenue	10,663,000	9,314,000
Earnings	844,000	620,000

OUOTRON SYSTEMS
Three Months Ended Merch 31

	1977	1976
Shr Ernd	$.28	$.37
Revenue	7,383,62$	6,31$,2$8
Tax Cred	493,78$	616,248
Earnings	961,024	1,1$1,722

SHARED MEDICAL SYSTEMS
Three Months Ended Merch 31

	1977	1976
Shr Ernd	$.$3	$.39
Revenue	10,313,631	8,404,8$6
Earnings	1,$49,793	996,93$

Computerworld Sales Offices

Vice-President/Marketing
Roy Einreinhofer
Advertising Administrator
Terry Williams
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Mike Burman
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelan
Account Coordinator
COMPUTERWORLD
1212 Hearst Bldg.
San Francisco, Calif. 94103
Phone: (415) 495-0990

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Judy Milford
Account Coordinator
1434 Westwood Boulevard
Los Angeles, Calif. 90024
(213) 475-8486

Japan:
Mr. Shigema Takahashi
General Manager
Dempa/Computerworld
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: J2424461

United Kingdom:
Tony Vickers
Computerworld Publishing Ltd.
140-146 Camden Street
London NW1 9PF, England
Phone: (01) 485-2248
Telex: UK-26-47-37

West Germany:
Hans-Jurgen Ballnath
Computerworld GmbH
8000 Munich 40
Tristanstrasse 11
West Germany
Phone: (089) 36-40-36
Telex: W.Ger-5-215250-HKFD

TRADE*OUOTES.

Computerworld Stock Trading Summary

CLOSING PRICES WEONESOAY, JUNE 1, 1977

All statistics compiled, computed and formatted by TRADE*OUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		19TT RANGE (1)	CLOSE JUNE 1 19TT	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMOAHL CORP	0- 39	22 1/4	- 1/4	-1.1
N	BURROUGHS CORP	55- 91	5T 1/8	- T/8	-1.5
O	COMPUTER AUTOMATION	18- 2T	26 7/8	+1 5/8	+6.4
N	CONTROL OATA CORP	20- 26	20	- 1/2	-2.4
N	OATA GENERAL CORP	35- 46	40 1/2	+1 1/4	+3.1
N	OATAPOINT CORP	18- 30	20 7/8	- T/8	-4.0
N	OIGITAL EQUIPMEN7	37- 53	41 1/2	+1 1/4	+3.1
N	ELECTRONIC ASSOC.	2- 3	1 7/8	+ 1/8	+7.1
A	ELECTRONIC ENGINEER.	8- 10	7 3/4	- 1/4	-3.1
O	FOUR-PHASE SYSTEMS	14- 17	13 5/8	0	0.0
N	FOX8ORO	42- 54	50 1/8	- 1/4	-0.4
O	GENERAL AUTOMATION	6- 9	6	0	0.0
O	GRI COMPUTER CORP	1- 1	3/4	0	0.0
N	HEWLETT-PACKARO CO	69- 8T	74	- 1/8	-0.1
N	HONEYWELL INC	44- 59	50 1/8	+ 7/8	+1.7
N	I8M	245-286	248	+ 7/8	+0.3
O	MANAGEMENT ASSIST	5- 9	4 3/4	- 1/8	-2.5
O	MEMOREX	23- 29	24	+1 1/4	+5.4
O	MICROOATA CORP	7- 18	8 1/2	+ 1/4	+3.0
O	MODULAR COMPUTER SYS	5- 8	6 7/8	0	0.0
N	NCR	32- 38	34 3/8	+ 1/8	+0.3
O	PRIME COMPUTER INC	12- 17	14 3/8	+ 5/8	+4.5
N	PERKIN-ELMER	17- 21	16 7/8	-1	-5.5
N	RAYTHEON CO	55- 65	63 3/4	+ 3/4	+1.1
N	SPERRY RAND	34- 42	34 5/8	- 1/2	-1.4
O	SYCOR INC	8- 15	8 1/2	- 1/8	-1.4
A	SYSTEMS ENG. LABS	5- 7	6	+ 1/8	+2.1
N	VARIAN ASSOCIATES	15- 20	19 1/8	+ 1/4	+1.3
A	WANG LA8S.	14- 18	14 3/4	+ 1/8	+0.8

LEASING COMPANIES

EXCH		19TT RANGE (1)	CLOSE JUNE 1 19TT	WEEK NET CHNGE	WEEK PCT CHNGE
O	800THE COURIER CORP	8- 10	7 7/8	- 1/4	-3.0
O	COMOISCO INC	10- 13	9 3/4	- 1/2	-4.8
A	COMMERCE GROUP CORP	2- 2	2	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	7/8	0	0.0
M	OA7RONIC RENTAL	1- 2	1	0	0.0
A	OCL INC	1- 2	2 1/8	+ 1/2	+30.T
N	OPF INC	6- 8	6 5/8	0	0.0
N	ITEL	13- 16	15 5/8	0	0.0
N	LEASCO CORP	19- 24	21	+ 3/8	+1.8
O	LEASPAC CORP	1- 1	1/2	- 1/4	-33.3
O	NRG INC	0- 0	1/8	0	0.0
A	PIONEER TEX CORP	T- 11	6 1/2	- 1/8	-1.8
N	U.S. LEASING	10- 13	11 5/8	+ 1/8	+1.0

SOFTWARE & EOP SERVICES

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	1- 2	1 1/4	0	0.0
O	ANACOMP INC	T- 9	8 7/8	- 1/8	-1.3
A	APPLIEO OATA RES.	5- 7	7	0	0.0
N	AUTOMATIC OATA PROC	23- 30	24 T/8	-1	-3.8
O	COLEMAN AMERICAN COS	2- 2	1 3/4	+ 1/8	+T.6
O	COMPU-SERV NETWORK	10- 15	12	- 1/4	-2.0
O	COMP ELECTION SYSTMS	6- 9	8 5/8	+ 3/8	+4.5
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
O	COMPUTER NETWORK	6- 7	6 1/8	- 1/2	-T.5
N	COMPUTER SCIENCES	7- 9	7 5/8	- 1/8	-1.6
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	2- 3	1 3/4	- 1/8	-6.6
O	COMSHARE	5- T	5 1/4	0	0.0
O	OATA OIMENSIONS INC	4- 5	4	- 1/4	-5.8
O	OATATA8	1- 2	2	- 1/8	-5.8
N	ELECTRONIC OATA SYS.	16- 19	16 3/4	- 1/4	-1.4
O	INSYTE CORP	2- 3	1 3/4	0	0.0
O	IPS COMPUTER MARKET.	1- 2	1 1/2	0	0.0
O	KEANE ASSOCIA7ES	3- 4	3 3/4	- 1/4	-6.2
O	KEYOATA CORP	2- 3	2 3/8	+ 1/8	+5.5
A	LOGICON	7- 16	12 1/8	- 7/8	-6.7
A	MANAGEMENT OATA	1- 2	1 1/4	0	0.0
A	NATIONAL CSS INC	19- 25	19 7/8	- 7/8	-4.2
O	NATIONAL OATA CORP	4- 7	4 3/8	- 1/4	-5.4
A	ON LINE SYSTEMS INC	1T- 22	1T	0	0.0
N	PLANNING RESEARCH	3- 5	3 1/2	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIOATA INC	2- 3	2	0	0.0
O	REYNOLDS & REYNOLO	1T- 20	1T 1/4	- 1/4	-1.4
O	SCIENTIFIC COMPUTERS	1- 3	3 1/2	0	0.0
O	TYMSHARE INC	14- 20	1T	+ 1/4	+1.4
A	URS SYSTEMS	4- 5	4 3/4	0	0.0
N	WYLY CORP	1- 2	1 1/2	0	0.0

PERIPHERALS & SU8SYSTEMS

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOORESSOGRAPH-MULT	10- 14	12 1/4	+1	+8.8
O	AOVANCEO MEMORY SYS	T- 9	7 7/8	- 1/8	-1.5
N	AMPEX CORP	8- 9	8	- 1/8	-1.5
O	ANOERSON JACO8SON	3- 4	3 3/8	- 1/8	-3.5
N	APPLIEO OIG OATA SYS	10- 16	12 7/8	+1 7/8	+17.0
O	8EEHIVE INT'L	9- 12	8 3/4	+ 1/4	+2.9
A	8OLT,8ERANEK & NEW	7- 8	6 5/8	- 1/8	-1.8
N	8UNKER-RAMO	8- 12	9 1/2	+ 1/8	+1.3
A	CALCOMP	3- 5	2 3/4	0	0.0
O	CAMBRIOGE MEMORIES	1- 3	2 1/2	+ 1/8	+5.2
N	CENTRONICS OATA COMP	22- 28	27	+2 1/8	+8.5
O	COOEX CORP	31- 47	43	-3 1/4	-7.0
O	COGNITRONICS	1- 1	3/4	0	0.0
O	COMPUTER COMMUN.	5- 6	5 7/8	+ 1/8	+2.1
O	COMPUTER CONSOLES	4- 7	5 3/4	- 1/4	-4.1
A	COMPUTER EOUIPMENT	2- 3	3 1/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 1	1 1/8	0	0.0
O	COMTEN	9- 13	9 1/4	-1 1/8	-10.8
N	CONRAC CORP	21- 28	21 3/4	-4 5/8	-17.5

SUPPLIES & ACCESSORIES

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	8ALTIMORE 8US FORMS	2- 4	1 7/8	0	0.0
A	8ARRY WRIGHT	10- 14	11 5/8	- 1/4	-2.1
O	CY8ERNATICS INC	1- 1	1/2	0	0.0
O	OUPLEX PRODUCTS INC	14- 18	16 1/2	+ 1/4	+1.5
N	ENNIS 8US. FORMS	6- T	5 7/8	0	0.0
O	GRAHAM MAGNETICS	11- 14	13	- 1/4	-1.8
O	GRAPHIC CONTROLS	15- 18	16 3/4	- 1/4	-1.4
N	3M COMPANY	48- 56	48 T/8	+ 3/8	+0.T
O	MOORE CORP LTO	30- 3T	30	0	0.0
N	NASHUA CORP	16- 22	19 3/4	+ 1/4	+1.2
O	STANOARO REGISTER	18- 24	23 1/4	+ 1/2	+2.1
O	TA8 PRODUCTS CO	13- 17	15 3/4	0	0.0
N	UARCO	19- 22	19 7/8	- 3/8	-1.8
A	WA8ASH MAGNETICS	10- 15	13 3/8	+ 1/4	+1.9
N	WALLACE 8US FORMS	1T- 21	1T 1/2	- 1/2	-2.7

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-8ALT-WASH
L=NATIONAL; M=MIOWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE 8IO PRICES AS OF 3 P.M. OR LAST 8IO
(1) TO NEAREST OOLLAR

"MSA's personnel management and reporting system is my first draft choice."

"I learned that it keeps records on more people than live in Atlanta, San Diego, Boston, and Los Angeles combined!" Froncis Torkenton, MSA

MSA's Personnel Management and Reporting System enjoys widespread popularity in virtually every kind of business all over the country. The System helps management comply with Federal governmental EEO, ERISA and OSHA requirements. And is designed in such a way as to be easily interfaced with the MSA Payroll Accounting System. Highlights include: comprehensive personal data, skills inventory, salary and performance review as well as termination and leave of absence reporting.

For further information call
Marge Kimbrough at (404) 262-2376
or mail this coupon.

MSA

THE FINANCIAL SOFTWARE COMPANY

Monogement Science Americo, Inc.
3445 Peochtree Road, N.E., Dept E-1
Atlonto, Georgio 30326, (404) 262-2376

Chicogó 312-986-2450;
Los Angeles 213-822-9766;
New York 201-871-4700

NAME _____

COMPANY _____

TITLE _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

PHONE _____ COMPUTER MODEL _____

I om interested in:
- ☐ Personnel Monagement ond Reporting
- ☐ Generol Ledger FICS
- ☐ Payroll Accounting
- ☐ ALLTAX™
- ☐ Supplies Inventory Control ond Purchosing
- ☐ Accounts Receivoble
- ☐ Accounts Payable
- ☐ Fincnoicl Information ond Control
- ☐ Fixed Asset/Property Accounting

Member SIA Software Industry Association